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NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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Chemical Industry in the United States

CONDITIONS of depression in chemical industry are not confined entirely to Britain. They are paralleled, even as regards details, in the United States. The after-war period was initiated by active trade and development. The swollen staffs of the war years were retained, and attempts were made to transfer their energies to peace-time pursuits. Had the inevitable drastic reductions in staff been faced earlier, present conditions would probably be healthier. Instead, it was assumed that the country could sustain the burdens of active development work on as intensive a scale as only the necessities of a nation in arms could justify. The larger organisations embarked on new programmes. Chemists leaving Government services were requisitioned by private organisations, and their knowledge, gained during the war years, was applied to problems of peace. For example, several schemes of nitrogen fixation were embarked upon, the majority of which, after a considerable outlay, have already fallen by the wayside. A multiplicity of dye-research organisations showed a mushroom growth which could not be healthily maintained. Rubber manufacturers looked to the universities for the best physical and colloid chemists that could be tempted away. The chemical conventions of the country, during 1919 and the bulk of 1920, found a happy, prosperous air prevailing, congratulations being general as to the position which the chemist had won for himself during the great world war. Towards the close of last year the storm-clouds were gathering. Heavy capital outlays, necessary for the transference of laboratory investigations to production basis, were not forthcoming. The decreasing price of Chilean nitrate left its mark on nitrogen-fixation schemes. Abstention by consumers from even ordinary purchasing (as a protest against continued high prices) had its effect on the textile industry, and thus on the bleach and dye industries. An over-estimate of tyre consumption involved the rubber companies in an unprecedented slump and acute financial difficulties. Sharp declines in the prices of oils and fats seriously affected the soap and edible-fat industries. The iron, steel, and metal industries reflected the diminution in consumption. In the spring of the present year the visitor to the meeting of the American Chemical Society at Rochester could observe that the industry was passing through a period of exceptional difficulty, that readjustments, alike for employer and employed, were in progress, which spelled anxiety in general.

Such readjustment is now in full swing, and in some cases already completed. Staffs have been radically pruned. The weaker members have been eliminated, the potentially strong have been strengthened thereby. From being at a premium in the market, the chemist, if of average calibre, is at a discount. As a result, the general ability of the organisations is distinctly higher, if numerically the staffs are considerably less. Reabsorption into the industry of those dismissed will occur slowly. It should not cause as grave difficulties in America as in this country, since the worker there shows a greater measure of resiliency and adaptability than does his *confrère* here. Nor is the problem as complicated there as here. Though greater in numbers than in pre-war years, the student chemists in American universities have not multiplied as in the British universities. No parallel can be quoted to the case of one of the northern universities in this country, where this year there are sixty graduates in the honours school of chemistry, as contrasted with six in the pre-war years. Where so many are available, eclecticism is possible, and the general standard should be considerably enhanced. But the majority of such graduates are undoubtedly face to face with difficult times. American conditions will be such, however, that for some considerable time there will be a plentiful supply of chemists of average ability, able to handle the problems of normal routine. For the specialist, with his own expert and individual knowledge, there is still a fairly free market. The problems he will be called upon to handle are those of a steady and robust growth of the industry, in contrast to the hectic energies of the past few years.

Choice of Sulphuric Acid Plant

WITH things as they are it is scarcely probable that further sulphuric acid plant will be required in this country for some time, so that the problem of design is not one which will arise in the near future. It is interesting, however, with the war experience behind us, to consider the lines upon which sulphuric acid plant is likely to develop structurally. It will be remembered that about two years ago a Departmental Committee of the Ministry of Munitions published a Report which dealt with the respective merits of the various acid making processes, and it may be gathered from the remarks then made that, at any rate for the majority of more ordinary purposes, the chamber system can still give a very good account of itself.

We have referred to the matter because our attention has been drawn to the modified chamber and tower systems by a small but excellent volume on "Sulphur and Allied Products" which has recently been written by Dr. Harold Auden. The author deals very carefully with the designs introduced within recent years, and mentions that—in lieu of the familiar comparatively shallow chamber—modern practice favours a lofty form. The main object must be the attainment of thorough intermixing of the gases present, and this is undoubtedly assisted by introducing polygonal chambers or by the tangential system which imparts a swirling motion. One of the primary aims is, of course, to reduce the volume of chamber space per unit weight of sulphur consumed, and in this respect some considerable improvement has been made. As the Chief Alkali Inspector remarked in his 1920 Report, when new installations are contemplated factors now enter into the reckoning which were either unknown years ago or did not possess the same importance that they do to-day. In these days ground space and materials of construction are points carrying much greater weight than they used to do, and intensive working has much to be said for it. From the Alkali Report for 1885 it is seen that the chamber space per pound of sulphur burned per diem varied between the wide limits of 40 and 19 cubic feet in Scotland and Ireland, whereas in the S.W. of England the variation was between 46 and 18 cubic feet. It is still common to find the older plants working at 18 to 20 cubic feet; but with the introduction of water sprays, &c., more intensive working has resulted, and in some instances the space in the ordinary chamber system has been brought to so low a figure as 8 cubic feet. With newer types of plant a still further reduction is effected; but naturally closer supervision is demanded.

With the modern tower systems the names Opl and Greisheim are mainly associated, and Mr. Auden expresses the opinion that such systems have not yet proved themselves in all respects superior to alternative designs. Almost the whole of the literature relating to the tower processes is contained in patent specifications of various countries, and very little information is to be found outside this source. It is at present impossible to forecast the future of the rival systems, but it is obvious that a very large number of conditions of locality, raw materials, &c., must be considered in each case.

The Inflation Trick

THE plot to inflate the currency thickens and progresses. The figures relating to revenue and expenditure for the six months ending September 30 are, from the point of view of the Chancellor of the Exchequer, extremely serious. The Budget estimates provided for a decrease of two hundred millions in the revenue for the whole year, while, as things have turned out, the first six months have landed the Exchequer with a decrease of over 163 millions. It follows from this that the financial position of the Chancellor is a very difficult one, and that he is faced with the prospect of a deficit instead of a surplus when he comes to the end of next March.

The Government has failed utterly to do anything serious in the matter of economies, and to escape the results now proposes to resort once again to the printing press. This subject is so technical and so complicated that it is difficult to arouse the general public upon it. The seriousness of the British Empire financing itself through the printing press is difficult to bring home to the man in the street. He has read his history, he knows what King John did to debase the currency, he is vaguely aware of the horrible result of the use of the printing press in the Latin American Republic, but because our paper sovereign is still worth something, and is not yet the subject of ridicule, he fails to see the folly of which he is the victim. The Treasury is in difficulties because the country cannot pay. Every business man knows what that means from his own personal experience. Those difficulties can only be removed by a reduction in expenditure. Such a reduction is, of course, unpleasant and inconvenient, but that is not a worthy consideration. The *Times* newspaper told us last week that "it is, therefore, generally admitted that fresh inflation is inevitable in the next few months." Such a policy can only mean a continuation of the present rate of taxation, a continuation of the process of undermining the financial stability of every firm and individual in the country and, in consequence, further and far greater difficulties in the future.

The Safeguarding of Industries List

WHILE the Safeguarding of Industries Act came in for a great deal of criticism, there is no doubt that the list of articles chargeable with duty under Part I. of the Act is regarded on all sides with decidedly mixed feelings. It is, perhaps, rather early to form very decided opinions on the effect of the Act, but already there have been a number of expressions of dissatisfaction at the extent of the list issued by the Board of Trade. Both manufacturers and traders have expressed the opinion that it is a weakening of the Act to include one or two thousand chemicals that are only needed in minute quantities for research work. A number of objections against the inclusion of some of the articles have, it is understood, already been lodged. It will be recollected that the Act provides that such complaints shall be referred to the arbitration of a referee, to be appointed by the Lord Chancellor. At the time of writing we understand that no referee has yet been appointed, but the attention of the Lord Chancellor has been drawn to the fact that the need for action has arisen. It is not intended to delay any

inquiry longer than is absolutely necessary. It cannot be stated what applications are being made to the Board of Trade for the imposition of duties under Part II. of the Act, but those who are in principle opposed to this provision *in toto* derive satisfaction from the statement, published last week, that the sittings of the Committee at which evidence will be taken on these matters will be held in public, except where the evidence to be tendered is of a confidential character.

Dry Cleaned Coal

THE main objection to coal-cleaning systems as at present in vogue is that—whether water separation or froth flotation is the method employed—the recovered material contains a large quantity of moisture, and must, therefore, be submitted to some form of drying before it can be used. This drawback is not, of course, sufficiently serious to impair the efficacy of such processes, but if a means was presented of effecting separation without the employment of water it would certainly be conducive to the more general application of coal purification. In the solution of knotty problems of this kind American workers are usually in the forefront, and one is not surprised to hear, therefore, that experiments have been made in connexion with the separation of small coal and dirt by passing the mixture through air currents. In the machine used, air as the floating medium is substituted for water, advantage as usual being taken of the varying densities of the different ingredients of the mixture. The air current is supplied by an ordinary blower fan which delivers into an air chest. A perforated deck of steel cloth or silk is provided to the chest, and this forms the separating arrangement. In this way a multiplicity of tiny air jets is formed, and these on expanding give rise to a film of air on the upper surface of the deck. The application of this air film is followed by stratification of the mixture, the heaviest particles sinking to the bottom, the lightest rising to the top, and those of intermediate density forming zones between the upmost and lowest layers. It is said that with a properly regulated air current the mass of material becomes almost as fluid as water, the layers of separated materials readily slipping, one from the other, to their specific take-off spouts. As regards results, it is shown that the refuse contains only a small proportion of carbon, while it seems that the sulphur tends to carry forward with the coal, and the phosphorus to remain largely in the refuse. Dry concentrating machines have, of course, been utilised in connexion with metallic ores, but this is the first time we have heard of the same principle being applied to coal, and as a novelty with distinct possibilities it will be well worth watching.

The State and Scientific Research

IN common with other services, scientific and industrial research has during the current year suffered a considerable curtailment of State financial support, and further reductions have been provided for in the estimates for 1922–23. The Privy Council Committee, while recognising the need for economy, do not conceal their anxiety at this restriction of the resources placed at their disposal for work which is of the greatest importance to the country, and this anxiety is fully shared by the Advisory Council of Scientists. In their annual report, which has just been issued, they point out that the limitation already imposed will inevitably involve the postponement of researches which are important in the national interest, while over the whole programme of work its effect will be to retard progress. Scientific research is, they very properly state, the main, if not the only, source of fresh productivity in industry, for it is only by increased productivity that the world will find a way out of its present economic difficulties.

Technical Books Advisory Service

WE have received so many requests from our readers for advice in the choice of technical books, that we have decided to extend our service in this direction. We have accordingly added to our staff an expert who has made an intimate study, during a long period of years, of the technical literature of the chemical industry and whose experience and knowledge of the subject is unrivalled. This arrangement will enable us, with the minimum of delay, to assist those of our readers who may find a difficulty in tracing just the right book for their purpose, and will obviate the necessity of a lengthy search through catalogues and works of reference. It often happens that a particular piece of information of the greatest value is to be found concealed in a simple chapter of a work which might not be supposed, from its title, to cover the subject in question. It will be our pleasure to bring such information to our readers' attention, as well as to answer enquiries of a more general character; and we shall also be glad at any time to procure books, when desired, and to despatch them to any address in the British Empire.

The Calendar

Oct. 10	Sir John Cass Technical Institute: "The Geology of Petroleum." E. H. Cunningham Craig, B.A. 7 p.m.	Sir John Cass Institute, Jewry St., Aldgate, E.C.
11	Sheffield Association of Metallurgists and Metallurgical Chemists: "The Hardening of Tool Steels." S. N. Brayshaw. 7.30 p.m.	Royal Victoria Hotel, Sheffield.
12	The Industrial League and Council: "The Importance to the Worker of Initiative and Enterprise." C. Jesson, M.P. 7.30 p.m.	Caxton Hall, Caxton Street, Westminster, London.
14-22	Commercial Motor Exhibition...	Olympia.
17	University College: "Liquid Fuels." H. Moore. 5.30 p.m.	King's College, Strand, London.
17	Chemical Industry Club: Annual Meeting.	2, Whitehall Court, London.
18	Hull Chemical and Engineering Society: "Wrapping Machinery." F. Glover. 7.30 p.m.	Wilberforce Café, Waterworks St., Hull.

Books Received

HANDBOOK OF CHEMISTRY AND PHYSICS. Eighth Edition. 1920-1921. By Charles D. Hodgman. London: Chapman & Hall, Ltd., pp. 711. 24s.

SILVER ORES. By H. B. Cronshaw. London: John Murray. Pp. 152. 6s. net.

FIXATION OF ATMOSPHERIC NITROGEN. By John Knox. Second edition. London: Gurney & Jackson. Pp. 121. 4s. net.

Faraday Society's Discussion on Catalysis

Newer Theories of Chemical Action

Last week we published abstracts of two of the papers presented at the General Discussion on the subject of "Catalysis with Special Reference to Newer Theories of Chemical Action." We give below an abstract of a paper on the mechanism of the "Catalytic Action of Platinum," together with extracts from speeches made during the discussion.

Mechanism of the Catalytic Action of Platinum

By Irving Langmuir, D.Sc.

The reaction between hydrogen and oxygen in contact with a platinum surface has long served as the most typical example of catalytic action. Faraday made a detailed study* of the power of platinum to induce combination of these gases and found that it depended upon the previous treatment of the metallic surface and upon the absence of even minute traces of certain gases.

Most chemists seem to feel that the nature of catalytic action is almost as great a mystery to-day as it was in Faraday's time. With our increasing knowledge of the structure of solid bodies and the atoms and molecules of which they are built, we should now, however, gradually begin to gain a clear insight into the mechanisms of such surface actions.

As a result of experimental and theoretical studies of thermionic emission and chemical reactions in high vacuum the writer became impressed with the remarkable stability of certain monomolecular adsorbed films even on highly heated wires or filaments and came to realise the importance of such films in determining chemical effects. To obtain a better understanding of catalytic actions, several series of experiments were carried out by heating platinum wires to various temperatures in mixtures of oxygen and hydrogen or oxygen and carbon monoxide at low pressures. The products of the reaction were condensed as fast as formed in a portion of the apparatus cooled by liquid air. The rate of decrease of pressure thus served as a measure of the reaction velocity. It was hoped that the kinetics of these reactions would throw light on the mechanism of the catalytic action.

Preliminary Experiments

The first preliminary experiments with the platinum wire heated considerably below a red heat in mixtures of carbon monoxide and oxygen showed that the velocity of the reaction under these conditions is proportional to the pressure of the oxygen, but inversely proportional to the pressure of carbon monoxide. It was then found that Bodenstein and Ohlmer † in their study of the reaction between these gases on surfaces of fused quartz, had obtained these same relations at about atmospheric pressure. Subsequently, Bodenstein and Fink‡ suggested tentatively that the explanation of this peculiar behaviour might be that the surface of the quartz glass is covered by an adsorbed film of carbon monoxide of a thickness proportional to the pressure of the gas. By then assuming that the oxygen has to diffuse through the layer of carbon monoxide before coming into contact with the quartz glass where it reacts with the monoxide, it was possible to explain the fact that the rate of reaction is proportional to the pressure of oxygen and inversely proportional to the pressure of carbon monoxide.

There were serious objections to applying this theory in the present case, for in order that the thickness of the film could be proportional to the pressure over a wide range it would be necessary to have a film many molecules deep, and this seemed improbable especially at the low pressures used in these experiments with platinum wires.

These difficulties disappear, however, if we consider that the adsorbed film of carbon monoxide is a monomolecular film which nearly but not quite completely covers the surface. Regarding the carbon monoxide molecules as chemically combined with the underlying platinum atoms, we have a logical reason for believing that the oxygen molecules striking the carbon monoxide film should be unable to react with it, for the carbon monoxide molecules would be oriented on the surface, the carbon atoms being directly combined with the platinum and the oxygen atoms covering the carbon atoms and protecting them from the action of the oxygen molecules which strike the surface. As the individual carbon monoxide molecules evaporate from the surface they leave vacant spaces. The oxygen molecules and carbon monoxide molecules in the surrounding gas then compete with each other in reaching these spaces. If a space becomes filled with a carbon monoxide molecule the gap in the carbon monoxide film is thus repaired, but if it becomes filled by an oxygen molecule, this molecule (or each of the resulting oxygen atoms) can react with the carbon monoxide molecules which strike it and thus form carbon dioxide which will be held by weaker chemical forces and will therefore distil off rapidly. This process leaves the space still vacant so that another oxygen molecule can be adsorbed and a carbon dioxide molecule formed. This action continues until the space becomes filled by a carbon monoxide molecule. It is almost self-evident, under these conditions, that the velocity of the reaction will be proportional to the pressure of oxygen and inversely proportional to that of the carbon monoxide. As the temperature is raised the rate of reaction increases in proportion to the rate of evaporation of carbon monoxide from the adsorbed film. The "heat of activation," of this reaction is thus merely the latent heat of evaporation of the adsorbed carbon monoxide.

On the basis of this theory, it is clear that as the temperature is raised or the pressure of carbon monoxide is lowered, the reaction velocity continues to increase until the film of monoxide no longer covers the larger part of the surface. The carbon monoxide will then cease to act as a catalytic poison. In any case, however, there must be a definite upper limit to the reaction velocity fixed by the rate at which the gas molecules strike the surface of the filament. This rate is the same as that of effusion through small openings and may be calculated according to the principles of the kinetic theory.

Carbon Monoxide and Oxygen

When mixtures of carbon monoxide and oxygen at pressures up to a few hundred bars (0·1 mm.) are brought into contact with a smooth platinum surface at 500° to 700°K., they react at a rate proportional to the partial pressure of oxygen and inversely proportional to the pressure of monoxide. The reaction velocity increases rapidly with the temperature, about 1·6- fold for 10 deg. at 600 deg.

With the platinum at 750° to 1,050°K. the velocity is practically independent of the temperature, being limited largely by the rate at which the gases can come into contact with the surface. With an excess of oxygen, the velocity is proportional to the pressure of monoxide, while with an excess of monoxide the rate is proportional to the pressure of the oxygen.

A theoretical quantitative analysis of the experimental results leads to the following conception of the mechanism of the reaction. Every oxygen molecule which strikes a clean platinum surface condenses on the surface in the form of single atoms combined with separate platinum atoms. This chemical union is so firm that there is no appreciable evaporation of the oxygen atoms from the surface even with the platinum at 1,500°K. These adsorbed oxygen atoms are in a very active condition in regard to their ability to react with monoxide, for every molecule of carbon monoxide which strikes an adsorbed oxygen atom reacts with it to form dioxide. When monoxide molecules strike a clean platinum surface, every one condenses on the surface being held by chemical union between the carbon atom and two platinum atoms. An adsorbed film of monoxide thus consists of a monomolecular layer of oriented molecules. These adsorbed molecules are not as firmly held to the surface as oxygen atoms, for they evaporate at an appreciable rate at temperatures as low as 500°K. Because of their orientation the monoxide molecules are very inert chemically towards oxygen. At 500°K. only about one oxygen molecule out of 10 which strike a surface covered with adsorbed monoxide reacts with the monoxide.

* "Experimental Researches," Everyman's Edition, pp. 8-111.
† *Zeit. physik. Chem.*, LIII., 166 (1905).
‡ *Zeit. physik. Chem.*, LX., 46 (1907).

The heat of evaporation of adsorbed monoxide is 31,800 calories per gram molecule; and at 700°K. with a pressure of one bar of monoxide, at least half of the platinum surface is covered with adsorbed monoxide.

In the low temperature range the surface is nearly completely covered by a monoxide film, and the reaction occurs only when monoxide molecules strike oxygen atoms which have become adsorbed in the spaces left vacant by the evaporation of monoxide molecules.

In the high temperature range the surface is nearly covered with oxygen when there is an excess of oxygen, and the reaction velocity is then limited by the rate at which the monoxide strikes the surface. With an excess of monoxide the surface is largely bare. The reaction velocity is limited by the rate at which the oxygen strikes the surface, for every oxygen molecule remains on the surface (in atomic condition) until struck by a monoxide molecule.

Hydrogen and Oxygen

At low temperatures (300° to 600°K.) rather erratic results are obtained, for the reaction velocity with mixtures of hydrogen and oxygen for the velocity depends upon the previous treatment of the platinum. When the platinum is in a relatively inactive condition the results are similar to those obtained with carbon monoxide and oxygen, the velocity being roughly proportional to the pressure of oxygen and inversely to that of the hydrogen.

At high temperatures (700° to 1,900°K.) the results correspond closely to those obtained with monoxide, the hydrogen having the same function as the monoxide. At these temperatures the reaction is not sensitive to the previous treatment of the platinum.

These results indicate that the adsorbed oxygen atoms are very reactive towards hydrogen, every collision between a hydrogen molecule and an adsorbed oxygen atom resulting in combination. Under certain conditions adsorbed hydrogen atoms are relatively inactive towards oxygen molecules, but the platinum can be brought into a condition which enables the adsorbed hydrogen to react with oxygen molecules or with the oxygen adsorbed in adjacent spaces on the surface.

Apparatus Used

In all the experiments the platinum filaments were mounted in glass bulbs sealed to a vacuum system consisting of Töpler pump, McLeod gauge, and a trap cooled in liquid air placed close to the bulb to condense mercury vapour and the carbon dioxide or water vapour produced by the reaction. The preliminary exhaustion was done by a Gaede rotary mercury pump. All joints in the apparatus were glass sealed to glass and stop-cocks were avoided entirely, mercury seals being used to separate the different parts of the system so that gases could be measured before admitting to the bulb. The McLeod gauge had a sensitiveness such that a reading of 1·0 cm. on the capillary corresponded to a pressure of 0·942 bars. The gauge had been in use several years and had been found to give very reliable readings of pressure.

The gases removed from the system by the Töpler pump were collected over mercury, and could be analysed by measuring the changes in pressure that occurred after adding oxygen or hydrogen and glowing a small platinum wire.

The Discussion

Professor PERRIN, of Paris, opened the discussion, speaking in French, and dealt in a very comprehensive manner with the case for the radiation hypothesis, now more or less familiar.

Professor F. A. LINDEMANN said Professor Perrin's argument in favour of the radiation theory that if we diminish the number of collisions to one-half, the reaction velocity is sensibly diminished, was sound if the facts assumed were sound. Assuming that we could diminish the number of collisions indefinitely, we should finally have some reaction velocity when we had no collisions whatever. If that was so, we must attribute reaction velocity to something independent of molecules, and consequently to radiation. An argument put forward by Professor Lewis was that they were dealing with directed radiation; it was not temperature radiation. Frankly, he could not see what the difference was. Supposing they had a molecule that was about to dissociate under the influence of radiation. Radiation fell on it and how could the molecule know whether it was temperature radiation or not. A single molecule had no temperature. It could not tell whether it was in equilibrium. It had a certain density and if the density determined the rate of dissociation of the molecule, he could not see why it should not dissociate, and he did not think that argument has been completely made.

Basis of Modern Theories

Professor E. C. C. BALY said that all theories of the absorption of energy by molecules, more particularly the modern radiation theories of chemical reaction, were based on the assumption that molecules are characterised by definite free periods of vibration. Further, the energy quantum theory had as its basis the additional assumption that the absorption and radiation of energy at the molecular frequencies were not continuous but discontinuous. It was a necessary sequitur that any radiation theory of chemical reaction developed from these two initial assumptions must be one of monochromatic radiation. It had been first shown by Henri and Wurmser, and more conclusively by Langmuir, that all these theories entirely failed to explain the facts, the number of molecules that reacted being enormously greater than that calculated from the known amount of energy absorbed. It was possible to formulate a theory of absorption of energy which was based on assumptions different from those which were usually made.

It might be assumed first, that an elementary atom was characterised not by a free period of vibration, but by a definite amount of energy associated with a specific physical change in the atom, such, for instance, as the shift of an electron from one orbit to another. On this assumption an atom could only gain or lose energy in terms of this unit or elementary atomic quantum of energy. A second assumption might be made that the physical change in the atom occupied a definite period of time which was the same for all atoms. The atom then became capable of absorbing or radiating energy of a definite frequency. It might in the third place be assumed that the elementary quanta of all the known atoms were integral multiples of a fundamental unit which very possibly was the elementary quantum of the hydrogen ion. On the basis of these three assumptions, it was possible to formulate a theory of chemical reaction which had very material advantages over the better known monochromatic theories.

Dr. IRVING LANGMUIR said there was no direct evidence in confirmation of the radiation hypothesis. It was all surmise. There had not been a single argument that could be definitely considered as concrete evidence in favour of the radiation hypothesis. All the explanations had something in common, and he believed they all depended on the quantum theory. Indeed, if this discussion had been called the quantum theory of chemical action, they would have had less discussion and more contributions to real knowledge and facts. In other words, the chemists were now up against what the physicists had been up against for a long time. They have got to explain chemical phenomena in terms of quantum relationships.

Professor LEWIS said, in reply, that the main point he would like to deal with was that which was brought out by Dr. Langmuir, who emphasised the fact that in a lot of these things they were dealing with phenomena which ought to be treated essentially from the standpoint of the quantum theory, and he argued therefore that since radiation itself was just one such phenomenon, why attribute to it any special significance or importance? The philosophic position that Dr. Langmuir occupied, therefore, was that the treatment of chemical change, and the treatment of radiation and the treatment of other things should be from the quantum theory, and that they were all equally important, but that one was not in any sense the natural cause of the other. In reply to that, the special place that was given to radiation was that it was the source and origin of chemical change. The evidence for that seemed to be given by the well-known fact that there was such a thing as photo-chemistry.

Surface Action

Dr. ERIC RIDEAL, referring to the postulate, now generally recognised, that surface action only occurs in the film that is adsorbed, said that in the case of gases, one could calculate out the rate at which the gas hit the surface, and it was found that in a great number of cases the rate at which it hit the surface was very much greater than the rate of catalytic action at that surface, so they were not troubling in gaseous

reactions with the phenomenon of diffusion; but in the case of semi-liquid reaction, especially oils, the rate at which the reactions could diffuse with the surface was sometimes enormous, and sometimes a good deal slower than the rate at which the chemical action took place. Therefore, in that case they had to measure the actual rate of diffusion. In the case of a solution of zinc, acids and cases of that type, they were on the borderline of the two cases.

Hydrolysis of Methyl Acetate

A second point of interest was that the molecules were orientated, and Dr. Langmuir laid stress on the point of surface tension. They also apparently were capable of orientation in one or two different positions. Work had been done in Holland on the hydrolysis of methyl acetate by means of caustic soda, and shown that caustic soda in water was selectively adsorbed by charcoal, and there was a selective adsorption of methyl acetate. In face of this, we would expect that charcoal would act as a catalyst, but that was by no means the case. Charcoal had no positive catalytic action at all on the hydrolysis of methyl acetate by caustic soda, so we could say that not only must all molecules be adsorbed in an orientated position, but that in the case of certain molecules they were capable of different types of orientation in which the active surfaces were brought together, or might be sticking one on top of the other. If we assumed a polar and a non-polar end to the molecules we must assume that the reactive groupings were brought in contact with one another side by side, and the non-active groupings facing each other. That could be extended, as in the case of the hydrogenation of benzene.

There was also the possibility of a series of molecules being built up in one layer, whilst there was also evidence that the surface of a catalyst was by no means totally active, and that its catalytic power could be enormously increased by the aid of promoters. Promoters could function sometimes by giving an extended surface although the apparent surface was the same. There was some evidence of this, as, for instance, the addition of a small quantity of potash in an iron mixture for combination of nitrogen and hydrogen. That would adjust the ratio between the two surfaces so as to form ammonia very readily. There were two or three purely chemical investigations of that type which were necessary to get a deeper insight into the reasons why these things did combine. He had found cases in which adsorption definitely took place, but combination was not accelerated. Therefore, there must be orientation which he had a certain amount of evidence for in surface tension phenomena.

The Hydroxylation Theory

Professor W. A. BONE, in a communication, said it was more than 20 years ago that he first turned his attention to the experimental study of the influence of hot surfaces in accelerating gaseous combustion. His first experiments were upon the oxidation of methane and other hydrocarbons in contact with the surfaces of porous porcelain at temperatures of about 400 deg. C., during which many proofs were obtained of the correctness of what was now known as the hydroxylation theory of hydrocarbon combustion. As, however, it became abundantly clear during those experiments that the hot porcelain-surface was considerably accelerating the interaction of the hydrocarbon and oxygen in the apparatus, he decided to take up the systematic study of catalytic or, as he preferred to call it, "surface" combustion with a view to finding out precisely how hot surfaces acted in such cases. Aided by a succession of skilful collaborators he had been able to amass a considerable body of experimental facts, all clearly proved and capable of demonstration, and also, in conjunction with the late Mr. C. D. McCourt, he discovered and subsequently worked out in detail flameless incandescent surface combustion. In 1906, also, he published, in conjunction with Dr. R. V. Wheeler, a paper entitled "The Combination of Hydrogen and Oxygen in Contact with hot Surfaces" in the Philosophical Transactions of the Royal Society, which in several particulars undoubtedly foreshadowed and prepared the way for later theoretical developments of the subject now under discussion, notably those of Dr. Langmuir.

Catalytic Combustion of Carbonic Oxide

Somewhat later, in conjunction with Mr. H. Hartley, he discovered that the adsorption of the gases (and their catalytic combustion), incontact with a metallic surface such as gold or silver, was accompanied by certain electrical effects, and the bearing of these new facts was set forth in the report of the Gaseous Explosions Committee of the British Association in 1910. Meanwhile, he had taken up an extended experimental study of the catalytic oxidation of CO, the results of which had yet to be published. In 1916, ten years after the publication of the Bone and Wheeler researches, Dr. Langmuir published his well-known memoir upon the Constitution and Fundamental Properties of Solids and Liquids, a theory of heterogeneous catalytic reactions which included and elaborated the basic idea previously put forward by Bone and Wheeler, without, however, mentioning their work. In the basic particulars, Langmuir's views did not differ from, or go further than, those which Bone and Wheeler had previously put forward. Langmuir proceeded, however, to elaborate them mathematically and speculating in a most suggestive and valuable way, beyond the point which he (Professor Bone) had carried them or would have been prepared to go. He himself was now testing experimentally some of Langmuir's extensions of these ideas in the light of his own later work on the catalytic combustion of carbonic oxide, which he hoped shortly to publish. In conclusion, Professor Bone stated that long experience had taught him how easy it was to speculate at any length on the subject of catalysis and how difficult it was to reconcile theories with facts.

Spreading of Oil over Water

Professor EDWIN EDSER spoke with regard to the rapid spreading of oil over water. A remarkable point about it was that when certain oils, such as triglyceride or oleic acid, were put on the surface of clean water, the oil spread over the surface with quite remarkable velocity. It was about the same speed as that at which a soap bubble enlarged and ruptured. The spreading occurred at the rate of 25 to 50 miles an hour. That was a very remarkable fact and was pointed out by Osborne Reynolds many years ago, who gave the explanation that the whole phenomena was due to the fact that the attraction of a molecule was not confined to molecules in contact with it but extended to quite a considerable distance. It was easy to see that if there was a drop of oil on the surface of water and the only action was between the molecules of oil in contact with the water, there was no reason at all why the oil should spread. On the other hand, if it was assumed that the water not only attracted the layer of oil molecules directly in contact with it but also attracted a considerable thickness of oil, the effect, if the attraction was great enough, would be to squeeze the layer and squeeze the molecules out.

He had for some years past been working on the subject of surface tension from a point of view very different from that adopted by Dr. Langmuir. He had assumed that a molecule attracted another molecule with a certain definite force. Further, he had assumed that two molecules could never get closer than a certain distance apart, which would be the case, of course, if the molecules had a sort of spherical shell and an attracting nucleus. These nuclei would attract and pull the molecules together until the shell came in contact, and nothing more would happen. Working out this theory on these assumptions, he had been able to calculate from other physical data such as latent heats, coefficients of expansion and density of compressibility of liquids, the surface tension of nearly every liquid which was not of too complicated a molecular character, up as far, for instance, as a liquid as complicated as naphthalene, starting with liquid hydrogen. The only liquid which gave discordant results was mercury.

The United Alkali Company, Ltd., have given their employees notice of a 5s. weekly reduction in wages beginning on Oct. 13.

In addition to the papers already announced for the meeting of THE CHEMICAL SOCIETY at Burlington House, on Thursday, the following papers were presented: "The Action of Diazo-Salts on Aromatic Sulphonamides. Part I.," by P. K. Dutt, H. R. Whitehead and A. Wormall; "Neutral Salt Action on the Hydrolysis of Ethyl Formate," by A. B. Manning; "Synthetic Optical Activity," by A. Shimomura and J. B. Cohen; "Chenopodium Oil," by T. A. Henry and H. Paget; and "The Mechanism of the Action of Fused Alkalis. Part II., Action of Fused Potassium Hydroxide on Phenylglyceric Acid," by (the late) H. R. Le Sueur and C. C. Wood.

The Sixty-second Meeting of the American Chemical Society

Impressions of an English Chemist

From time to time during the meetings of the Society of Chemical Industry and the joint meetings of that body with the American Chemical Society, we have published a series of impressions by "L. A. J." We give below some further impressions on the annual meeting of the latter Society and certain other matters of chemical interest which occurred to the writer during the visit.

IT would be wellnigh impossible for any one person to appreciate as much as one half of the activities of the American Chemical Society at its 62nd Annual Meeting, held at Columbia University, New York City, in 1921. The gathering was of an international nature and preparation was made to hold meetings 3,000 strong. It is true that numbers fell a little short of this figure, but one could quite easily see what a huge organisation the American Chemical Society is, and the great place it holds in the public life of the United States.

An attempt is here made to give a few impressions of the occasion as they appeared to a visiting Englishman. Reference has been made so many times now to the magnificent reception given to the English members of the Society of Chemical Industry that by this time it is idle to observe that our entertainment in New York, and the provisions made for our bodily comforts, lacked nothing of the traditional American hospitality. In spite, however, of the warmth of the welcome, the press of public duty and the strain of the round of official entertainment, one could from time to time enjoy a few minutes comparative repose. At such moments in the hot weather which prevailed, the proper thing to do undoubtedly was to drink. But what with the drink, which may range from the synthetic grape juice of the Heyden Chemical Company, through the whole bewildering array of the "Candy-Store" pharmacist, to synthetic gin or even illicit whiskey, and the hustle required to get it, need an Englishman be ashamed to confess to having murmured once or twice, "There is no place like Home."

The New York Police

New York is undoubtedly a wonderful place, and people are quite right when they call attention to the magnificent view of the city from the water, showing the huge buildings of the lower town silhouetted against the night sky. Perhaps, however, we should have stayed longer and gone at it much more gently. There are so many things liable to disturb the peace of mind of one accustomed only to leisurely London. One never seemed able to get used to the menacing manner in which the police swing their shillelaghs. It really is not comfortable to be corrected for permitting a cigarette end to fall upon the pavement with such an instrument so ready to the corrector's hand.

When one considers, however, the heterogeneous nature of the populace of the States, especially New York, which is said to be the first Jewish city in the world and houses more Italians than Rome, one must agree that discipline is necessary in general if not quite so dramatic in particular. The traffic problem is, of course, as acute as ever it was; the method of light signals used at the present time for traffic direction along Fifth Avenue is splendid, but an amelioration of this nature, however, cannot affect the concentration of population in Manhattan Island, and surely very soon the limit of concentration must be reached.

Americans generally are proud of the fact that New York is very rapidly approaching London in point of size, and in that connexion an American lady one afternoon was saying that Greater New York would shortly possess (when the last census was known) half a million more people than are found in Greater London; "Madam, you are very welcome to them," was hardly, perhaps, the retort courteous, but it was nevertheless expressive. New York is impressive—its buildings are majestic and a mighty monument to human energy, but nevertheless something suggestive of a menace. There is no peace, except in sleep.

Work of the American Chemical Society

The American Chemical Society has some 15,000 members, and it can safely be said that this society is the parent of all the societies interested in chemistry and the chemical industries of America. In its scope it embraces morally, if not physically, all the numerous smaller and younger societies such as the Institute of Chemical Engineers with its 500 members, the American Electro-Chemical Society, and numerous other societies with specific chemical and even business aims. One is very surprised at the large number of business men who are members of the Chemical Society, and not only are they members, but they attend meetings regularly. They constitute a powerful group, and their interest has undoubtedly done much to strengthen the position of chemistry in the States, and has also helped the material prospects of the professional chemist himself.

Now the ramifications of chemical industry and the distribution of its influence and products is to-day so broad that these numerous specialised organisations are necessary to protect the interests of the business men and manufacturers against legislation which affects their products, to foster specific lines of research, and to deal with matters which are peculiarly vital to specific industries. In the matter of presenting a bold front, in educating and guiding public opinion, and, it might almost be said, advising Ministers of State, then the American Chemical Society embraces the whole. Everyone is a member of the Chemical Society, and such a body has immense weight and influence. In England we have no direct equivalent, though we might approach it by amalgamating the membership, aims, and publications of the Chemical Society and the Society of Chemical Industry, together with the active participation of say a thousand business men interested in chemical matters, but who as yet take no part in the work of the Societies. The power and influence of the American Chemical Society is found (1) in its complete membership, extending through the country in 50 local sections; (2) in the officers, past and present, who have directed its organisation; in this list one finds the names of all the leading American chemists, amongst them men of almost world-wide reputation in both academic and industrial circles; (3) in the Society's three publications, the *Journal of the American Chemical Society*, *Chemical Abstracts*, and the *Journal of Industrial and Engineering Chemistry*. These journals circulate throughout the world.

Unification of Scientific Literature

The increasing wealth of technical publications, however, tends to produce a revolt. Almost everyone agrees that present-day scientific publications duplicate a great deal of matter at the cost of money, time and annoyance to the person who has to sort it out afterwards. I may therefore be permitted to revive once more the question of amalgamating the published works of the English-speaking scientific societies. This, of course, has been discussed many times in the past, both officially and unofficially. Even during the meetings this summer it occupied a prominent place in private conversation.

It is useless to attempt a finished scheme, for such would be beyond the power of an individual, but it is possible to look around the question and see what little things get in the way. In the past it was English obstinacy that prevented unified publication, but to-day one would probably meet more opposition to the scheme in America than in England, unless we allowed America to do it all (at any rate as far as abstracting is concerned), and took copies of the publication.

Treatment of Abstracts

The real problem is, of course, with abstracts. In trying to cope with the task of keeping abreast of the current literature, what is more irritating then continually to come across some particularly inane contribution, abstracted with the most meticulous care, time and time again. After appearing in the literature of the United Kingdom it returns in due course via America in *Chemical Abstracts*, and possibly from German sources too.

With regard to Transactions of the societies, they probably would require different treatment, but would it not be splendid if the agreed main object were to provide in England and America one volume or series of volumes which gave within its pages everything which now appears in the pages of the various publications of the American Chemical Society, the Chemical Society, and the Society of Chemical Industry? Such a comprehensive volume might or might not be cheaper to produce; that would require to be worked out, but it would be of great service to anyone in the habit of consulting the records.

The spelling difficulty is perhaps the latest source of trouble. Can one imagine our learned societies countenancing words like "sulfur" and "thru"? The American, however, gives one the impression that he would rather fight than surrender his "nu spelling."

As before remarked, the excuse for reviving this old problem is that it was the subject of conversation in America this summer, and many people still cherish the hope that something may be done to join the work of our societies in the two countries and so help to promote that *liaison* between the English speaking peoples about which we hear so much.

The American Chemical Society has a fully organised Press bureau directed by that very able and charming man, Dr. Charles Herty. This office issues copy to the Press on any matter worthy of attention. For the daily newspapers the matter is written up in a popular style, and for the technical papers in a technical style, and as the work is done by technical people, there is very little chance of misstatements reaching the public. In consequence the American receives doses of scientific knowledge at regular intervals; he finds it not unpleasant, reads it, and so becomes reasonably well informed on such matters.

Status of the Chemist

It may be due to this training, or perhaps to the prominent association of business men with the American Chemical Society, that chemists and chemical engineers enjoy a more exalted state in the public mind and in the minds of their employers than is the case in this country. The war also may have done much to develop these things, but it is certain that the multitudes in America know that in modern civilisation the chemist is at least as indispensable as the engineer. In America the term "chemist" means something, and it is a name to be proud of, for it ranks high in the professions; in England it might mean anything, for the general public knows no better.

There is, of course, a weakness in the position. The extent to which the publicity has been developed has tended perhaps to make the level of chemical thought exchanged a little less profound than one expects from these meetings, and one could not help but feel that some speakers had their eye not so much upon the present company as upon the outside public. The political aspect was seen in connexion with the tariff measure which is now before the Senate in connexion with protecting the dye industry.

The Dyestuffs Position

It would appear that not only the chemical industry but American business in general has had little peace for the last year over the tariff question. Without pretending to understand the situation, it would appear to be much the same as our experience, only rather worse. Whilst the dye licence has been thrown backwards and forwards between the House of Representatives and the Senate, the chemical and dye industries have been taken care of in some degree by an emergency tariff which expires on November 27 next. Whilst the fight has been going on, the market for dyestuffs and chemicals has been stagnant, and several people express as their opinion that the proposed tariff now waiting approval by the Senate cannot prevent European chemicals reaching the American market lower than the domestic cost of manufacture with the present disparity of exchange.

Chemical Warfare

Chemical warfare occupied a prominent and semi-political place in the proceedings; the arguments were advanced with characteristic vigour and emphasis, and there is no doubt that the majority of people thoroughly appreciate the position that chemistry is likely to attain in any future war. Speaker after speaker pointed out that war is not only a matter of arms, ammunition, aeroplane and submarine, but that it is equally a matter of medicines, gas and chemicals.

Disarmament

But for the chemists of Germany she would have lost the war before America got into it, and but for the chemists of the Allies, Germany would have won the war in the end. The manner and ingenuity by which Germany developed her resources and produced chemical substitutes for almost everything long after the blockade had been established has earned the admiration of any thinking person. The admiration should not be allowed to warp the judgment, for the lesson to be learned is that the German must not be allowed again to get a hold on the chemical industry of America or England. The coming conference at Washington on "Disarmament" has cast its shadow before at New York. The feeling was that there could be no complete disarmament, on the ground that disarmament was only an economic measure and not an insurance against international conflagration. Agreement may be reached to limit armies and navies, but how could one agree upon a limitation of brains? What conference would presume to forbid the manufacture of those chemicals which are the recognised necessities of modern civilised life? For whilst any country is operating its chemical factories, it has a war weapon ready, and therefore there can be no complete disarmament. Rather, does not everything point to each country developing its resources on chemical lines leading up to the establishment of a large chemical industry with research organisations, not only providing for the needs of that chemical industry but indirectly providing for the protection of the chemical-warfare service. America is convinced that this is going to be the great arm of the future.

Energy in Chemical Reactions

Attention was directed in various ways by two or three of the chief speakers to a consideration of the energy problem, new sources of supply to deal with the world's immediate demands, and the application of energy in chemical reactions. Nowadays the organic chemist is in possession of methods of working very different from those used in the past. No longer is it necessary to distil organic substances through red-hot tubes or to perpetrate other acts of violence upon them, for chemical research has developed beyond all recognition since the chemist studied the more subtle methods of applying low-potential energy in the presence of a catalyst. This lesson was learned from Nature's laboratory, for it is well known how the metabolism of animal and vegetable organisms build up complex organic compounds without appreciable temperature variation, and without any exhibition or suggestion that a vigorous chemical reaction has taken place. The significance of these matters is well recognised to-day, and consequently experimental methods in organic chemistry are becoming more and more delicate as they approach the bio-chemical field and the low-potential methods of the vital processes of both animals and plants.

The logical conclusion to be drawn from this is that in the future the function and task of the chemical manufacturer will be bound to change. So far, the chemical manufacturer has busied himself with the conversion of one material into some other desirable material by means of costly high-potential energy and human labour. Only rarely as yet have we seen the manufacturer make use of the living organism, as in the fermentation processes for alcohol, acetic acid, acetone, &c., because the technique required has not been developed.

As Sir William Pope pointed out, when we possess full working details concerning the plant-leaf process for converting carbon dioxide and water into formaldehyde and oxygen by utilising the sun's energy, when we can make indigo and quinine by the methods adopted by the plant, then chemical technology will be an entirely different proposition from what it is to-day. When that time comes we will be fortunate in having a great part of the tropical world within our range, for it is certain that the intensive production of organic substances of tropical vegetable and animal origin offers a great field for development. It is possible that a scientific study and technical treatment of oil-bearing plants in tropical regions may lead to such improvements in the yield and cost of production that these vegetable oils, such as cotton-seed oil, will supplement and ultimately replace the ordinary fuels, coal and petroleum, now used the whole world over.

Atmospheric Nitrogen

The same point of view is applicable to the nitrogen problem. Nature disseminates widely and preserves in dilute form many of her most valued gifts. Plant life, however, is capable of concentrating these valuable solutions, as, for instance, in the concentration of iodine in kelp from sea water, and in nitrogen from sewage and from the air. Plant life concentrates these substances, and may even turn them into compounds which can be assimilated by animals. A proper development of these functions might enable us to secure solid nitrogenous products which would render all other methods of fixing atmospheric nitrogen obsolete.

Dr. Little dealt with the problem of the sources of energy available in the immediate future. Whilst everyone is cognisant of sources of energy in conceivably greater amounts than those required for any possible human needs, the field is narrowed considerably in actual practice, and, further, in appraising the sources of energy it is necessary to consider values and availability, as well as quantity.,

In all the natural resources the continent of North America generally is well endowed, but not the least in those matters which affect the present question. It is generally assumed that the age of coal is passing, though our civilisation will be based on coal for many generations to come, but of the coal which remains some three-quarters is located in North America. Similarly with regard to petroleum, America has been fortunately placed, and to-day the U.S.A. produces about 70 per cent. of the world's supply. Canada is beginning to produce oil. Whilst these fields have scarcely been worked in many cases, American petroleum may be almost said to be on the decline, and some authorities give the life of the petroleum industry of the U.S.A. at little more than ten years.

On the other hand, the country is thick with motor vehicles representing some 212 million horse power, which is being added to at the rate of many thousands daily. At the present rate of development it cannot be long before America will want all the oil she produces, and unless someone exercises restraint it looks, as Dr. Little said, as though the old firm of Demand and Supply might be dissolved.

It is admitted and it is evident that oil has been wastefully mined, wastefully used and regarded like coal as being only fit to burn. But a fraction of the oil originally tapped has served a useful purpose, and a good deal of this waste has arisen from the small individual holding, for the miner must hustle to get his oil out or it will be taken by others from under his feet. The same remark applies largely to the use of natural gas in the U.S.A., in which waste again has done its best to outstrip use. It is a waning resource, although even yet one-tenth of the whole population is dependent upon it for light and heat, apart from its industrial uses.

Hydro-Electric Power Developments

The development of hydro-electric power commands a good deal of interest in these days, and it is surprising to learn that during recent years only 10 per cent. of the power expansion in the U.S.A. has been provided by water power, though many millions of horse power, well distributed geographically, await development. Hydro-electric power involves heavy initial expenditure, and to provide even moderate interest on this capital means a cost three times greater than all other operating costs. In a steam station the interest on invested capital will not be more than a quarter of other charges.

In these matters there is a good deal for Americans to think over, and no doubt better provision will be made in the future to prevent the exploitation of Nature's gifts to the ruin line. After all, it is a very human failing ; one which is perhaps inevitable in a new country, and the citizens of North America are not the only offenders, as a moment's reflection will convince anyone. It should be a source of pride to Americans that the sins of the past are being confessed, for that is the way to secure better treatment for those natural resources which as yet remain untouched, and that is no mean heritage. It is still possible to get rich quick in America, and the American is virile, active and as eager for riches as any other man. He is, however, prepared to work for them ; he lives nearer to nature than we do and thinks very keenly about his great country of which he is so justly proud. This and that requires to be done, and until it is done there can be no rest, for as he so often says, "We are a young country yet."

L. A. J.

Objects of the Dyestuffs Act

A Reply to Mr. Lennox Lee's Criticism

THE members of the Dyestuff Group of the Association of British Chemical Manufacturers have had their attention drawn to the speech delivered by Mr. Lennox B. Lee at the annual meeting of the Calico Printers' Association (*see* THE CHEMICAL AGE, Vol. V., p. 404), and feeling that the speech contains much which will misinform public opinion with regard to the British dyestuffs industry and to the action which Parliament has taken in prohibiting the importation of foreign dyestuffs except under licence they desire to make the following statement:—

It is not necessary to follow Mr. Lee through his economic argument, because the action of the Government in prohibiting the importation of dyestuffs is based on the all-important necessity of maintaining the safety and integrity of the British Empire. It is wrong, and dangerously wrong, to suggest on the basis of the general trade returns, that British chemical industry is sufficient for the needs of national defence. It is the undoubted lesson of the late war that the organic chemical industry, its established plant and its acquired skill, are absolutely fundamental in prosecuting warfare as it is understood to-day. In practice, the organic chemical industry is the intermediate product and dyestuff industry ; and it was for the purpose of preserving and developing this fundamental national asset that Parliament took the action of which Mr. Lee now disapproves.

Great Britain did not fight alone in the war, nor has she alone learned its lessons, and it is important to note that the system of prohibition in relation to the dyestuff industry has been adopted in France, in Italy and in the United States. It exists also in Australia and New Zealand, and is under the consideration of the Canadian Government. Mr. Lee would appear to suggest that the object of the Dyestuffs (Import Regulation) Act is to give assistance to those who are inefficient, but it will be obvious that the statesmen of four great Powers do not make such a drastic change in ordinary peace-time fiscal policy unless they have in their minds some much more important reason than the support of the inefficient.

The members of the Dyestuff Group are glad to remember that Mr. Lee was not, if reports can be relied upon, always of the opinion he now expresses. At a meeting of the Colour Users' Association held about the time the Dyestuffs Bill was being discussed in the House of Commons the then Chairman (Mr. Vernon Clay) referred to the Bill. The following extract from the report of the meeting which was given in *The Textile Mercury* of December 11, 1920 (page 603) is relevant to this point :—"Mr. Clay then dealt with the general situation and stated that early in 1918 the Committee was formed known as the Colour Users' Committee. That Committee operated until the Colour Users' Association was formed. They had in front of them what was a Government pledge given on May 15th, 1918, in the House of Commons, that the dyestuffs industry should be protected by a system of prohibition and licence. Certain people representing the dye consumers met the President of the Board of Trade (Sir Albert Stanley). They agreed that the best way of establishing a dye-making industry was by a system of licence and prohibition. The people who agreed were to a large extent represented in the calico printing trade. Among them were Mr. Lennox Lee and Mr. Gill. Mr. Allen, Mr. Lee and Sir Milton Sharp were among the members of the Committee who agreed to sign the memorandum for licence and prohibition, a system to establish dye-making in this country."

Further, in answer to a speech made by Mr. Hewitt of the Calico Printers' Association, we find (on page 604) the Chairman reported as having said :—"Mr. Hewitt knew that the question of licence and prohibition had been negotiated by the Chairman, Mr. Lee, ever since the beginning of 1918 . . . . . the Chairman of the Calico Printers' Association had had every opportunity of bringing Mr. Hewitt's scheme to the attention of the Government."

For the purpose of accurate quotation it has been necessary to mention the names of Mr. Gill, Mr. Allen and Sir Milton Sharp, but the members hasten to record their deep appreciation of the support they received and continue to receive, from those three gentlemen.

It is felt that such statements as those made by Mr. Lee are singularly dangerous and it is desired once more to place before the public what is believed to be the real reason for the action of the Government.

Reviews

THE ELECTRIC FURNACE. By J. N. Pring. London: Longmans, Green & Co. Pp. 485. 32s. net.

This latest volume of the "Monographs on Industrial Chemistry," edited by Sir Edward Thorpe, illustrates most emphatically the extraordinarily intensive development which modern chemistry is undergoing. Dr. Pring has collected the details of a subject which 50 years ago was in its infancy. To do this as excellently as it has been done in the present instance, the whole of 450 well-filled pages are required. The arc furnaces of Siemens in 1878 were the first efforts in the now well-established industries of electric smelting of iron ore and electric steel furnaces. Heroult in France and Hall in America in 1887 were the pioneers of the aluminium industry of to-day. Moissau's elegant investigations, commencing in the Paris Laboratories in 1892, established the industrial significance of the carbides, from which sprang the carbide, cyanamide, carborundum and graphite industries. Ferro-alloys were produced in carbide furnaces—they form an indispensable adjunct of modern steel metallurgy. Thus, within two or three decades, there has sprung up a development of industrial chemistry which substitutes for the older pyro-chemical processes the electrical methods of high-temperature production.

The laboratory is the cradle of most new industrial developments, and so a generous portion of the book is devoted to principles of furnace design, laboratory types of furnace, methods of current supply, of transformer design and of temperature control and measurement. A quarter of the book is thus excellently employed. The detailed treatment of individual industries is followed also by important sections on refractories, heat losses, the design and dimensions of electrodes and electrode terminals, and the power expenditures involved in electric-furnace processes. The final sections treat of water-power developments, Britain and the Empire receiving very full discussion, with a comparative treatment of steam power stations and electro-chemical centres.

It has been possible to incorporate in the book much of the information which has been disclosed recently as to progress during the war years, and the value of the book is enhanced considerably thereby. Carbide and the nitrogen-fixation industries gain especially as a result. The Haber, Claude and ammonia-oxidation processes are, it should however, be observed, only very secondarily electric-furnace operations, and in a bulky and so necessarily expensive volume, might have been curtailed in treatment or left out for fuller treatment in another volume of the series. In a similar case are the several aqueous electrolytic processes treated, which might well have been relegated to Mr. Hale's companion volume. The application of electric furnaces to the melting and preparation of alloys and non-ferrous metals could then have been amplified.

One might express the wish that there were more centres of active electro-chemical instruction in Britain, where Dr. Pring's book could be used as the standard and authoritative text. With modern knowledge on the production of electrical energy from steam power the development of electric-furnace operations in Britain becomes more and more feasible. Is the student chemist of to-day able to obtain the best possible orientation in this subject, that with perfect familiarity with the contents of this volume he may proceed to the pioneering of the future? H. S. T.

THE CHEMISTRY OF FAMILIAR THINGS. By S. S. Sadtler. London: The J. B. Lippincott Company. Pp. 322. 10s. 6d. net.

This volume has been written with the idea of presenting the natural attractions of chemical science in a non-technical manner. The author was formerly secretary and vice-president of the American Electrochemical Society, and is now editor of *Allen's Commercial Organic Chemistry*. The signs of the times seem to point to the popular possession of a desire for fundamental and accurate information on scientific matters; and while chemistry and the rôle it plays in everyday existence appealed in the past to very few who were not actually associated with it, there are to-day distinct signs that the average layman appreciates its attractions. Prior to the war it was most unusual to find allusion to chemical subjects in the daily newspapers, but nowadays current developments are accorded quite prominent notice, as witness the recent reports of the proceedings of the British Association. Unfortunately, however, there is no royal road to even a working knowledge of chemical or any other science, so that while Mr. Sadtler's book may provide some engaging popular reading where it gets away from non-technical terms and descriptions, it cannot hope to succeed any more than a host of others of its class. In other words, one cannot expect to go very far with the study of chemical processes if one commences at the end of the subject instead of with the fundamentals. The book, in fact, would appear to have far greater utility if put into the hands of students who have, say, completed their first year's course, for it considers broadly the many interesting possibilities of science, and might do much in the way of stimulating a desire to study the subject further. The first three chapters are mainly an attempt to grapple with the elementary principles of chemistry and its historical development, while the author then proceeds to treat of the composition of the "things about us." For example, we have a repetition of the story of the nitrogen cycle in the soil, a description of the functions of the human "internal-combustion engine," and a rather complex explanation of why the sky is blue. The volume closes with a chapter dealing with the "Chemical Elements in Scenery," where it is suggested that the ordinary tourist might derive far more interesting and profitable contemplation from a holiday if he is equipped with a knowledge of geology, woodcraft, biology and botany. M.

A TEXT-BOOK OF QUALITATIVE ANALYSIS OF INORGANIC SUBSTANCES. By Sydney Alexander Kay, D.Sc. London: Gurney & Jackson. Pp. 80. 7s. 6d. net.

Both the author and the publishers have done their work well in producing this little book. The subject matter is well arranged, and the instructions are printed on good paper and in clear type. The author has described the methods of analysis in sufficient detail to render it unnecessary for the student to receive constant supervision. Stress is properly laid upon the importance of the student learning to conduct analyses rapidly as well as accurately. The reviewer knows that years ago it was a common practice to allow students in training colleges to expend a great deal too much time over simple analytical and synthetic operations, and such students had sometimes to be sharply spurred into quicker and better organised methods of working when they were transferred to salaried occupations. Dr. Kay very properly says that it is unnecessary to be idle while evaporation or filtration is going on, and that practically every moment should be occupied in one way or another. A good many youthful consciences will be pricked when Dr. Kay's remarks concerning economy of time are read.

The author is right also in emphasising the importance of working with small quantities of the substances to be analysed. Much time is often wasted by handling large quantities of precipitates.

The subject matter of the book does not call for special notice as it covers the usual ground. The group tests, flame-coloration tests, blow-pipe tests, borax-bead tests and special tests for acidic radicals are all included. The index might with advantage be considerably extended. The student who wishes to examine a substance for lead, tin or iron will not find any of these metals mentioned in the index. He must remember to which group each metal belongs, and then turn to the page indicated for the group. H. F. H.

Handling of Ammonium Nitrate

To the Editor of THE CHEMICAL AGE

SIR,—In reading your article on the Oppau disaster, I notice your allusion to ammonium nitrate, and with regard to this it may interest you to hear that about, six weeks before the big explosion at Oppau, two trucks of ammonium nitrate, shipped under the orders of the Inter-Allied Commission in Berlin to some German industrial works, suddenly exploded, whilst being unloaded, with disastrous results. I believe that ten German labourers were killed, and that the trucks simply disappeared.

The explosion is as complete a mystery as the Oppau one, as up to that time ammonium nitrate had been treated with as little heed as nitrate of soda.

The explosion was, I believe, as mystifying to our experts as to the German ones.—Yours, etc.,

Fleet, Hants. FRED D'A. VINCENT.

The Prevention of Explosions

To the Editor of THE CHEMICAL AGE

SIR,—It is a truism which scarcely requires formulation that the chemical industry, in many of its branches, can never be free from the risks of explosions. The disastrous explosion at Oppau is too recent and so stamped upon the memory, that illustration of potential danger is unnecessary. The Oppau explosion, however, which the experience and skill of German chemists and engineers, the careful supervision and training of the workmen were powerless to prevent, is unique and will have to be considered in a class of its own. There are, on the other hand, types of explosions which recur from time to time in certain branches of the chemical and allied industries.

In the pulverisation of coal, wood, sugar, metals, &c., and in many other instances—there are produced atmospheres laden with combustible dusts. The ignition of such a dust—by means which need not be considered at the moment, but which are many and varied—sets up a rapid fire, communicated from layer to layer of the atmosphere, and "explosion" as we understand it takes place. The causes are well known, and the unfortunate results of neglect to take precautionary measures are too well exemplified in the frequency with which "dust explosions" have occurred.

There are two courses open in considering preventive measures. The first, namely, the elimination of the possibility of initial ignition, can scarcely be fully realised in practice, as the findings of committees of investigation on dust explosions will show. The second, in which the lowering of the concentration of oxygen in the atmosphere containing the dust to a point at which combustion is impossible, is capable of application in a large number of cases. The introduction of a gas mixture consisting of CO_2 and N_2 into the elevator, disintegrator, dust flue, &c., will definitely eliminate explosion risk. Such a gas mixture is easily produced by the complete combustion of coke in air, and should not cost more than a few pence per thousand cubic feet, all charges inclusive. The use of this inert gas mixture in pulverising installations and elevators, if sufficiently "tight housed," will throw no more than a fraction of a penny per ton of material treated upon the particular process concerned. In many instances, it is true, the use of inert gas appears at first sight out of the question, but determination to exclude risk of explosion will often initiate slight changes rendering such use possible.

In *Chemical and Metallurgical Engineering* White recently described a simple type of gas generator consisting of a primary and secondary coke furnace, gas scrubber and holder, and showed that the manipulation of the installation is easy, and requires little labour or attention. Experiments are also described upon the ignition of air laden with sulphur dust, and it is shown that 20—25 per cent. of the CO_2—N_2 mixture in air at ordinary temperatures and humidity, is sufficient to prevent ignition and therefore explosion.

In many operations where combustible dusts cannot be avoided, the only course open, if complete safety is to be guaranteed, is to eliminate the other constituent of the potential explosive atmosphere by substituting an inert gas for the air ordinarily present.

The same principle has been applied with success in the case of highly inflammable liquids and vapours. In the oxidation of acetaldehyde to acetic acid (as employed in the process of manufacturing synthetic acetic acid from calcium carbide, and as carried out in Canada, Germany and elsewhere), the nitrogen passing away from the "kettles" after the oxygen has been taken from the air-stream by the aldehyde, is passed to gas holders, and used as an inert atmosphere in all operations of charging, discharging, &c.

Again, the use of an inert gas in the storage and distribution of petrol was described in THE CHEMICAL AGE a short time ago.

Finally, a brief reference may be made to the method of extinguishing oil and petrol fires which consists in throwing or forming a froth holding CO_2 on the surface of the oil. Several compounds have been suggested, and used with success.

The chemical industry must necessarily make use of inflammable liquids and vapours, and must often produce combustible dust clouds. It is only rational that elimination of the oxygen essential for explosion or fire should be effected to the utmost limits of possibility. The circulation of a cheap inert gas provides a means which is capable of application in many instances.—Yours, etc.,

R. F.

Chemical Warfare

A Prominent American Chemist's Views

IN view of the controversy aroused by Sir William Pope's exposition in THE CHEMICAL AGE of the "Case for Chemical Warfare," the following extracts from a speech delivered by Mr. Francis P. Garvan, President of the United States Chemical Foundation, before a joint session of the Society of Chemical Industry and the American Chemical Society at Columbia University, are of interest as reflecting the trend of American opinion:

"As struggles between nations became more destructive, not only in actual warfare, but in the paralysing blows delivered to peace-time industry, more and more came to kneel at the altar of peace. When war science learned how to destroy thousands at a stroke, to ruin whole cities in the space of a breath drawn in the middle of the night, peace seemed more and more desirable. As the researchers in the sciences contributed in ever-increasing frightfulness to the power and long distance application of war weapons, destroying all the romance of industrial combat and nullifying individual courage, men began to see increasing merit in the dreams of those who would abolish war utterly and who would police the evil doers of the earth as such are policed in our cities.

"When the creative chemist showed military commanders how an opposing host could be stricken from life on the wings of the wind, laid horribly in death by a vapour as noiseless as the pinions of Azrael; how life could be expelled from great cities by a death dew of acids sprinkled from invisible airplanes, peace became a boon to be prayed for in utter sincerity. Hypocrisy smiling at gunpowder blanched before phosgene gas.

"Peace is much more popular now that men know how to destroy each other with cotton in the form of nitrocellulose drawn from the air, than when they abolished each other with cellulose in the form of a club. I do not say that the spread of education and gradual refinement of the spiritual side of man has not played a part in the growth of the ideal, nor that the operation of pure reason has not contributed to the vitality of the desire. I do maintain with history at my back that successive inventions of horribly destructive weapons and successive demonstrations of the magnified and unpreventable ruin and misery wrought by one new weapon after another, have been successive shocks to man's lifelong notions about the indispensability of war.

The Chemists' Task

"Then the creative chemist, taking a big step forward and making more intelligent use of atomic force, introduced into warfare weapons that could not be seen or heard, that impressed ordinary imagination as things not of this earth at all, but of the pit itself. He showed armies how to use poison gas to kill each other and more often to blind or burn or stupefy each other. He introduced poison into the winds of the heavens and cunningly employed the winds to sweep destruction across wide areas. This new method of making war was the biggest jar ever suffered by our tradition-clinging minds. It was a method which struck at the mind in assaulting the body. Terror unfathomable was locked in it.

"Inheritors of subconscious fears 200 centuries old, curious weaknessess of the spirit that 200 centuries have not been able altogether to eradicate—fear of the dark, fear of the unknown, man stood appalled by this new weapon which worked frightful casualties without betraying itself by form or shape or colour, without making a sound personal to itself. It made him think of the future when the inept, unhappy gas contrivances would be so perfected, simplified, concentrated and increased in number and in destructive power, as to make the gas weapons of the Great War as clumsy by comparison as were the smooth-bore rifles of the Revolutionary War compared with the latest machine-gun.

"These things hit at the heart of imagination, surveying what creative chemistry has already done in war in its first few experimental steps. We stand back impressed as never before in the whole history of war tools. We are bound by sheer intelligence to comprehend that chemical science 'has only begun to fight.' It has learned how to utilise, not very skilfully, a few gases. It has not done anything beyond small scale experimenting with radio active forces. But the lessons of the Great War were a tremendous impulse to the research chemist."

New York Chemical Exposition

By "L. A. J."

THE Management and Advisory Committee of the Seventh National Exposition of Chemical Industries have done a great work, and they have on record the most successful Exposition yet in spite of the depressing trade circumstances of this year. For some reason or other the Exposition had to find fresh quarters, and although the Artillery Armoury Building is rather a long way out of New York, the change was a blessing in disguise. With the displays of the various exhibitors, arranged on the immense floor of the drill hall, the Exposition presented an imposing spectacle. The drill hall of the Armoury afforded ample space for the booths, with plenty of room in the passage ways without using the balconies. The number of displays and the varied type of the exhibits was calculated to impress everyone, even chemists themselves, with the extraordinary range of chemical industry, and naturally of American chemical industry in particular. With the general results obtained and the strong interest shown in the proceedings the responsible officers should be very pleased. There was a record attendance, and it was estimated that some 60,000 to 70,000 people in all visited the show, and one can understand that from the moment the Exposition was formally opened by Dr. Herty, on the Monday evening, until it closed on the Saturday following, there was always a crowd pressing at the booths for information.

Public Interest

Further, it was certainly not a crowd which wandered aimlessly about, but was there for a definite set purpose, and not a few of the men were undoubtedly workers in the chemical trades. They examined sectional models of pumps, and new lubrication devices on plug cocks, and such like things, in a manner which betokened a daily interest in these matters. In spite also of the bad business year for the chemical industry, it is understood that many exhibiting firms have done good business at the Show.

An interesting and valuable feature of this Exposition is the extent to which the motion picture and the technical session have been developed. Technical sessions were held day by day, the topic for discussion being some definite chemical problem.

Interesting Technical Lectures

Various methods of producing power for operating chemical plant were outlined by experts in the several lines. On the Tuesday afternoon a symposium was held on crushing, grinding and pulverising for the chemical industry. Wednesday was the day for evaporating and drying. The paint and varnish industry, and the dyestuff and colour industry, had also their appointed times. These addresses were very good, and whilst the lecturers invariably had trade connexions they could not in any sense be accused of depressing the discourse down to the level of a trade advertisement. The discussions which took place were often very illuminating, and the whole proceedings compared well with the previous week's work of the divisional meetings of the American Chemical Society. The collected reports of these papers should be very valuable.

Usefulness of Moving Pictures

Every evening very fine motion pictures dealing with actual operations in chemical industry over a large range of subjects were shown, and these pictures soon became an important feature of the Exposition. They show that a film properly displayed will ensure that every subject has the attention which it deserves. The interest taken in the technical sessions and the attendance was large, but it was as nothing compared to the interest taken in the pictures. The films were provided by prominent manufacturers and by the U.S.A. Bureau of Mines.

Extraction of Radium

A very popular picture was one dealing with the extraction of radium which gained interest by reason of Madame Curie's recent visit to America. The source of the radium was carnotite ore which is found in large quantities in Colorado, and during the war years this work, conducted by the Bureau of Mines, yielded a million dollars' worth of radium at a cost very much less than the value. Among other interesting films seen was one showing the working of the sulphur mines of the Texas Gulf Sulphur Company. In the process used (the Frasch process) the sulphur is brought to the surface in a molten condition by means of superheated water, and it is then allowed to solidify in enormous bins.

Sulphur Industry in America

This picture was particularly interesting, because the development of the American sulphur industry has been an extraordinary one. It is an object-lesson in showing the far-reaching effects of being able to secure increased efficiency in the working of a mine. Before the development of the Frasch process, sulphur mining in America was very difficult and dangerous. In 1903 the production of American sulphur was 25,000 tons; in 1913 it reached 491,000 tons; and in 1920 1,255,000 tons. In 1906 American sulphur began by reason of the new methods employed to compete with Silician sulphur, which amounted at that date to roughly 500,000 tons per annum. Since 1906 the output of Silician sulphur has declined steadily, and at the present day it approximates to 200,000 tons annually, which is the consumption in Italy and the Mediterranean region to which the use of Silician sulphur is now almost confined.

Mining of Potash

Some potash mining pictures shown by the courtesy of the Société Commerciale de Potasses Alsace were greatly appreciated. E. I. Du Pont de Nemours & Co. exhibited a film showing some of their plant making dyestuffs, and such a film is of great value in dispelling the impression, so set in the lay mind, that a chemist extracts colours from coal as it were lump by lump in much the same way as a hen lays eggs. There were films showing the manufacture of cement, dynamite, white lead, paints, soap, sausages, margarine, and numerous other products. These pictures give an insight into the importance of chemical industry from an unusual point of view, and it is very evident that they have been not only one of the most attractive features of the exhibition, but one of the most valuable for the dissemination of knowledge. If the interest of exhibitors and visitors alike is any criterion, then the scope of the motion picture deserves to be expanded and it should be a feature of all such exhibitions in the future.

Machinery in Chemical Industry

The exhibits generally were very comprehensive, and by no means lacked novelty—in fact, there was much to be learned from them. It was frequently remarked that of the exhibits quite a number were machinery exhibits, and one was apt to contrast the number of these with the number of exhibits showing actual chemical products. It should, however, be a matter for surprise that such a wide variety of machinery is necessary for the production of finished chemical products.

The time is approaching when one can no longer expect to see each year at these exhibitions a large number of new chemical products made for the first time, and in consequence activity is directed very largely to improvement in the methods used to make well-known products which are in public demand. This is the type of progress which requires the development of new types of machinery, and surely we cannot have too much of it, for good mechanical dispositions on a plant have a great reflection in reduction of costs. There is no doubt that the chemical side of chemical engineering is often much in front of the engineering component, and therefore it is a matter for congratulation to observe the healthy developments in chemical engineering practice which were so prominently displayed at this show.

Hungarian Chemical Industry

BY the partition of Hungary the chemical industries were reduced to 118 separate factories, but since the war several new plants have been started, making 182 in all at the present time. In the 20 works devoted to the manufacture of pharmaceutical chemicals, 75 trained chemists are at present engaged, and substantial progress has been made, particularly in the manufacture of condensation products of phenol and formaldehyde and of photographic chemicals. In the period between September 1 and December 31, 1920, a total of 2,900 applications for licences to import and to export chemical products was dealt with. Of these 2,154 were granted, of which 1,180 were licences to import chemicals to the aggregate value of 215,000,000 crowns; 974 exports licences were granted, representing goods to the value of 320,000,000 crowns.

A Fool's Paradise

By Ernest J. P. Benn

I WAS talking the other day to a young mechanic, a toolmaker of the best type, a young man of about thirty-five, and a serious student of affairs. He was spending the week-end at a modest country hotel, and I came across him at the table where we were both enjoying a four-and-sixpenny dinner. We fell to discussing the 12½ per cent., and he explained to me what a serious matter it was from his point of view. He was a married man, without any family, and he found great difficulty in existing on his present pay. He saw no prospect of economising to the extent of 12½ per cent., and if this bonus were withdrawn he was prepared to go on strike.

When I left him I fell wondering how far he was typical of the rest of us. Here was a man of fair education and high ideals, keen to live the full life of a citizen, tasting and thoroughly enjoying some of the good things of life, and living on a scale which measured by his ethical attainments seemed on the face of it to be just, reasonable and proper. I was quite unable to argue with him, but, as so often happens, when I had left him I seemed to gather strength to put the other side of the case. This man is enjoying as many of the social amenities as were a few years ago within the grasp of the average middle-class employer. There are, indeed, very few of our fathers, whether in business or professional circles, who were able to afford many of the comforts which he very properly and naturally regards as his due.

Fictitious War-time Prosperity

It is a matter for sincere delight and congratulation that a mechanic, a toolmaker, can afford to keep a crease in his trousers and have a clean serviette for every meal at a week-end resort. It is very hard to suggest to the man who has enjoyed these things, appreciated them, and lived up to them, that he must now dispense with them. It seems to me that this young mechanic is very largely typical of the rest of us, and sums up within himself many of the difficulties which we find it so hard to encompass. Many of us are suffering from the taste of a fictitious war-time prosperity, and are equally reluctant to face the necessities of post-war poverty. This young man, like the majority of us, is in a little bit too much of a hurry to secure and enjoy those things which are within his reach if only he will do the right thing to secure them, and recognise that it is a long and troublesome process. He differs in no way from the retailer who, having for a brief spell enjoyed double the percentage of profit which was previously his due, is reluctant to give it up.

Value for Value

The simple question before us at the moment is to know how much of the bankruptcy court will be necessary to cause the individual to make the effort which sooner or later will be forced upon him. Exactly the same is true of the trade unionist, especially the unskilled trade unionist. Artificial scarcity has for years given an artificial value to the lowest grades of labour, and girls and boys who at their best were never quite worth their keep on a strict exchange basis, have found themselves the possessors of silk stockings and cigarettes and other amenities exceeding by far in value anything which they themselves contributed to the common stock. These young people have never been up against the simple equation "value for value," and the question is, how long it will take, and how much unemployment and suffering will be necessary before they will see the wisdom of facing that elementary problem fairly and courageously.

We have two or three million public servants in the same boat. For the period of the war the community was willing to support these people in order that they might perform all sorts of little services which together made up the business of saving us from the Hun. They gave "value for value" when we were engaged in winning the war, but since those days they have continued to draw from the common stock of commodities without putting into it anything which the rest of us can recognise as value.

The Right Way

A very simple illustration of the same difficulties is seen in the domestic servant question. Thousands of young women who before the war exchanged the cooking of puddings and the cleaning of steps for a modest living, were suddenly lifted into a fictitious position and enabled to enjoy social amenities far exceeding in value anything which they could normally produce in return. It is very hard to suggest that they must return—they will return all right in time—the pity is, that being mere human beings, instead of yielding to argument, they will probably prefer to learn a lesson in the school of bitter experience.

All this sounds like bad reaction, but it is really nothing of the kind. None of these people are enjoying more than they could secure if they would go the right way to get it, none of the advantages which are now so common are outside our grasp if only we will go the right way to get them. My friend the mechanic could enjoy all that he now possesses if only he would recognise the formula, "value for money," but in obedience to thoroughly uneconomic and fictitious rules and regulations he is, as a good trade unionist, deliberately contributing to the wealth of the world only a proportion of the total that he might give. Science and capital will bring everything to his feet in time, but restriction and revolution will only rob him of all.

> The common problem, yours, mine, everyone's,
> Is not to fancy what were fair in life
> Provided it could be, but, finding first
> What may be, then find how to make it fair
> Up to our means—a very different thing!
> No abstract intellectual plan of life
> Quite irrespective of life's plainest laws,
> But one, a man, who is man and nothing more,
> May lead within a world which (by your leave)
> Is Rome, or London—not Fool's Paradise.

German Potash Crisis

THE National Economic Committee of the German Reichstag is reported to be engaged on the consideration of a Government bill for the amendment of the existing legislation concerning the potash industry. According to local reports of the proceedings, Herr Kempner, president of the Federal Potash Board, stated that the future of the industry was dominated by the technical side or situation of the mines and works. Comprehensive works of re-establishment had become necessary owing to the conditions which prevailed during the war, and if these were carried out they would involve an enormous expenditure on account of the high prices. Such works, however, would be unremunerative under the state of depression now prevailing in the market. Under these circumstances, the president remarked that the bill proposed that potash mines should be stopped on a large scale, and the other departments be combined and concentrated. At present the prime costs of the works varied between 70 and 330 marks for the production of the same product, thus showing the unsound basis of production in the case of different works. If the suggested legislation were not enacted there would still be 204 mines, notwithstanding the unfavourable situation of the trade, and the Federal Potash Board could only answer in the negative the question as to the right of existence of such a large number of mines. The president proceeded to state that energetic assistance could only be afforded by a voluntary stoppage of the non-vital mines or by compulsion if necessary. The object of the stoppage was to keep the inland prices as low as possible, in order to approximate to those of phosphate and other fertilisers. During August only 130 mines out of 204 were in operation, but these were not systematic stoppages, and those mines which were at a standstill to-day might be at work again to-morrow according to the state of trade. Thus the stoppage was of but little advantage to the industry in general, as the mines and works at a standstill also had to bear the costs of maintenance and of restarting, all of which could be avoided if the unprofitable mines and works were definitely discontinued.

EXPERIMENTS to find a chemical which will protect PULP AND PULP WOOD from decay have resulted in a report by the American Paper and Pulp Association and the U.S. Forest Products Laboratory at Madison, Wis., that sodium fluoride seems to be the best disinfectant, with borax a close second. Boric acid is said to be equal or somewhat superior to borax, but its greater cost throws it out of the running. Sodium dinitrophenolate in ⅛ per cent. concentration appears very promising, with an antiseptic efficiency equal to anything tried, but the yellowish chemical discoloration of the pulp may prove objectionable for some purposes.

Affairs of Massey and Winbury

First Meeting of Creditors

THE receiving order in the case of Raymond Massey and Max Winbury, lately trading as Massey & Winbury, chemical agents, 17, Queen Victoria Street, E.C., was made on the petition of Victor Blagden & Co., chemical merchants, of Lloyd's Avenue, E.C., and the statutory first meeting of creditors was held on Tuesday at the London Bankruptcy Court. A statement of the debtors' affairs showed £2,589 due to the petitioning creditors under a judgment for damages for breach of contract, and no other debts; while no assets were disclosed.

The debtor Winbury, in a preliminary examination, had stated that when he was demobilised from the Air Force early in 1919 he entered into partnership with Massey and they started business as importers and exporters of merchandise, particularly chemicals. The business was successful and in order to obtain better facilities from bankers to enlarge the business they decided to convert it into a limited company. Accordingly Massey & Winbury, Ltd., was formed with a nominal capital of £10,000 in £1 shares, and they each received 1,500 shares and the appointment of joint managing directors.

The company agreed to assume all the liabilities and assets of the business as from June 30, 1920. Soon after the company started trading, however, the slump in chemicals occurred, and as a result the company went into voluntary liquidation in March last and the liquidator immediately closed the business. The present position was attributed to the failure of the company, which was brought about by general depression in trade and inability to recover book debts.

The creditors appointed Mr. Eric Portlock, chartered accountant, of 186, Bishopsgate, as trustee of the estate.

Tariff Uncertainty in Spain

SEVERAL British firms trading with Spain have recently shown uneasiness at the apparent inactivity of their agents in the Spanish market. The Commerical Secretary to His Majesty's Legation in Madrid (Mr. S. G. Irving), writing to the Department of Overseas Trade, states that this supposed "inactivity" may be easily explained up to a point by the two obvious factors which are at present combining to restrict the Spanish import trade, namely: the general depression and the high import duties. The general depression has been accentuated by the failure of the Bank of Barcelona and indirectly by military events in Morocco. Another obstacle is the restriction of credit owing to the necessitous condition of the Government. Most of the Treasury Bonds issued in the past year have been taken up by the Banks, who have had some difficulty in putting them on the market. A still more effective check on orders than any of these three factors exists in the prospect of an early alteration of the import duties, possibly in January next. As they have been already raised once this year they are hardly likely to be further increased, except in certain instances, while it is expected that some may be lowered. Importers are not unnaturally inclined to wait and see; the more so since several bought considerable stocks in anticipation of the increase in May last.

In the interval, while the revision of the tariff is actually taking place, there is no firm basis for making calculations, and until importers can adjust their buying policy on such a firm basis as a fixed tariff will provide—whether at higher or lower rates than at present obtain—it is unlikely that import trade in Spain will show increased liveliness.

Import Duty on Synthetic Camphor

The Vigilance Committee of the Fancy Goods Section of the London Chamber of Commerce has decided to approach the President of the Board of Trade with a request to remove SYNTHETIC CAMPHOR from the list of those articles liable to 33⅓ per cent. duty under the Safeguarding of Industries Act. It was stated by an authority on the making of fancy goods that synthetic camphor had never been made in Great Britain, and that to instal a plant here and secure the skilled assistance necessary to work it, and obtain the raw material from Japan, would mean a delay of months and perhaps years. A duty of 100 per cent. would be necessary to protect the industry, and ensure it a return for the financial outlay involved.

Rubber Shareholders' Association

The First Ordinary General Meeting

MR. D. F. L. ZORN, presiding on Monday at the first ordinary general meeting of the Rubber Shareholders' Association, said that during recent times an uneasy feeling had grown up among rubber shareholders that proposals for the better regulation of the industry were not weighed up and considered purely upon their merits, but that in a good many cases the decision of a particular company as to whether their support should be given to a scheme was influenced by the vested interests of those who feared that the suggested new departure might interfere with their private profits or emoluments. The progress of their movement was being watched carefully around many a board table. If their membership grew apace during the next few weeks he ventured to predict that they would soon see the effect reflected in the policy of the directors and others who had their capital in charge.

The following gentlemen were unanimously re-elected members of the Committee:—Mr. Henry T. Brice, Mr. R. B. Fidler, Mr. W. C. E. Gibson, M.B.E., Mr. R. Gordon Macmillan, Mr. William Mills, Mr. C. H. Niven, Mr. James Railton, Mr. Charles H. Rigg, Mr. W. B. Staveacre, Mr. W. Symington, Mr. E. Seth, and Mr. D. F. L. Zorn.

Sunflowers as a Source of Paper Pulp

IN the course of an article in *Papeterie*, M. Raymond Frounier describes the utilisation of the sunflower as a source of oil. He states that laboratory tests were made at the Paris Chamber of Commerce to determine its suitability as a source of paper pulp; these tests gave the following results: the stems were cut into small pieces and subjected to treatment with caustic soda and bleaching powder in the usual manner; the caustic caused a very decided yellowing which could not be removed by bleaching with bleaching powder, and, moreover, the mechanical separation of the fibres was difficult. The yield of air-dried fibre was 42·6 per cent. before, and 34·6 per cent. after treatment with bleaching powder. By using a 10 per cent. sodium peroxide solution instead of caustic soda, a whiter and more easily defibred pulp was obtained; it was, however, still quite difficult to defibre. The yield was 48·5 per cent. and 36·7 per cent. after bleaching. Microscopic examination of the pulp showed the cellulosic fibres to be covered with a lignified tissue. The fibres are 0·640–0·820 mm. long, and average 0·730 mm. The thickness is fairly constant and is about 0·022 mm.

Small scale tests carried out at the mill have shown that the sunflower can be pulped by means of existing equipment. The stems are washed, cut into lengths of about 2 to 3 cm., cooked for about 30 minutes in boiling water, and crushed between rolls rotating at different speeds. It is then cooked (without pressure) with a liquid containing 10 to 12 per cent. of caustic soda (on the weight of the air-dried material). After cooking, the material is washed first with hot and then with cold water. The unbleached pulp thus obtained may be used as such, and is decidedly superior to mechanical wood-pulp. It can be bleached (but not to a pure white) by the usual methods. The yield varies from 30 to 40 per cent. according to the state of maturity when cut, the length of time kept in storage, the concentration of the cooking liquor, the time of cooking, and the method of bleaching.

A New Electric Lamp

BY the introduction of their new Osglim bulb, the General Electric Co., Ltd., of Magnet House, Kingsway, W.C.2, claim to have solved the problem of producing electric lamps of extremely low candle-power and small current consumption suitable for use on ordinary electric-light circuits. A new principle is embodied in its manufacture. No filament is employed, but a glass bulb of the usual shape, and containing a quantity of neon, is fitted with two metal electrodes placed at a short distance from each other, and connected to the two terminals of the standard cap. The anode is connected to the lamp contact by which the current enters and the cathode to the contact by which it leaves. When current is switched on an electric discharge takes place between the two electrodes, which produces a light of a characteristic orange colour appearing as a luminous haze over and above the cathode. Each lamp, it is said, consumes about 5 watts.

French Society of Industrial Chemistry

First Annual Meeting and Exhibition

As previously announced in THE CHEMICAL AGE, the first Annual Meeting of the Société de Chimie Industrielle will be held in Paris from October 9 to 12, while a Chemical Exhibition will be open at the Conservatoire National des Arts et Métiers from October 7 to 16.

The programme opens to-morrow (Sunday) night, when visitors will be received at the Palais D'Orsay by the Council of the Société de Chimie Industrielle. Following this, at 9 30 p.m., there will be a reception by the Union of Chemical Industries.

The meeting proper opens on Monday at 9.30 a.m. at the Conservatoire National des Arts et Métiers, when M. Dior, Minister of Commerce, will preside. At this meeting, Sir William Pope will deliver an address on "The Future of Organic Chemistry." In the afternoon, Professor Camille Matignan will read a paper on "The State and the Development of Nitrogen Industries," and M. Gall will read a paper entitled "The French Cyanamide Industry."

At 8.30 p.m., under the presidency of M. J.-L. Breton, Director of Scientific and Industrial Research at the Ministry of Public Instruction, M. Georges Claude will give "Some Ideas on Scientific Research: The Synthesis of Ammonia." In the course of his lecture, M. Claude will deal at some length with the recent catastrophe at Oppau.

A joint meeting of sections will be held on Tuesday, when Professor H. Le Chatelier will read a paper on "Chemical Analysis." A banquet will be held in the evening, M. Lefebure du Prey, Minister of Agriculture, presiding. Wednesday will be spent in visiting works, the Institute of Applied Chemistry, etc.

Sectional meetings will be held on Monday, Tuesday and Wednesday, no fewer than 69 papers being down to be read to the 15 groups.

During the course of the Chemical Exhibition, lectures accompanied by cinematograph films will be given. The subjects include "The Manufacture of Glass," by M. Lecrenier, director of the Val-Saint Lambert Glassworks; "Modern Metallurgy," by M. de Freminville, consulting engineer to Schneider et Cie; "The Manufacture of Cement," by M. E. Caudlot; "Alsatian Potash," by M. C. Lormand, chemist to the Ministry of Agriculture; and "The Manufacture of Paper Pulp and Paper," by Dr. Fernand Meyer.

Deals in Soap

IN the Mayor's and City of London Court, on September 28, before Mr. Registrar Dell, Hodgson & Simpson, Ltd., soapmakers, Caldwell Yard, Upper Thames Street, E.C., sued Mr. G. A. Joyce, 118, Galloway Road, Shepherd's Bush, for £2 19s. for soap supplied. The defendant appeared and made an offer for the payment of the debt by instalments, of 5s. per month. Mr. H. Strouts, solicitor for the plaintiffs, said they were not prepared to accept the offer. The defendant said the debt was not his, but that of his sons, but he had made himself responsible for it. Judgment was entered for the plaintiffs and an order made for the payment of 10s. a month, the first payment to be made on October 12.

In another case heard in the same Court, Lever Bros., Ltd., 37 and 38, Upper Thames Street, E.C., sued the defendant in the former case for £10 19s. 5d. for soap supplied. Mr. H. Strouts, solicitor for the plaintiffs, said that as the amount in that case was larger than in the former he should ask that payment be made by instalments of £1 a month. In giving judgment for the plaintiffs, an order was made for payment by instalments as suggested.

Future of Alsatian Potash Mines

ON Tuesday the Colmar Court gave judgment in regard to the potash mines in Alsace which were exploited by a German company before the war, and which, if a decision of the Mulhouse tribunal had been upheld, would, for the most part, have been lost to France (*see* THE CHEMICAL AGE, Vol. V., pp. 256 and 406). The judgment reverses the decision of the Mulhouse Court and allows Henri Koch to retain his 29 personal shares only.

Disastrous Fire at Soap Factory

Damage Unofficially Estimated at £250,000

ON the night of October 1 an alarming fire broke out at the soapworks of Joseph Watson & Sons, Ltd., in Whitehall Road, Leeds. The outbreak, which was first observed at 8.30 p.m. in "B" mill, developed very rapidly and soon obtained a complete grip of the building. Six thousand barrels of resin were stored in the cellar underneath and large quantities of oils, tallow, and other fats were stored in the two upper storeys.

The soap mills at the Whitehall Works are constructed on a self-contained plan, a precaution which was adopted after a similar fire about 40 years ago, when the whole place was destroyed. In the reconstruction, each mill was made an independent unit, and the same scheme was embodied when the works were rebuilt and remodelled about 20 years ago. Thus, while one mill—and that an important one—has now been burnt down, the remaining two are intact, and by a rearrangement of shifts the whole of the staff of workpeople will continue to find employment. The works cover an important and central site in the city between the Midland and Great Northern Railway Stations.

No loss of life or personal injury resulted, but "B" mill was completely destroyed. The damage is unofficially estimated at £250,000.

Industry and Technical Education

ADDRESSING a meeting arranged by the Association of Teachers in Technical Institutions, at the Technical School, Birmingham, on October 1, on "The Interdependence of Industry and Technical Education," Professor Knox, of the Treforest School of Mines, said there had been in the last few years a big change in the attitude of mind of some employers in relation to the application of science to industrial concerns, more particularly of scientific research. This was largely the result of the difficulties we had passed through during the war. There were over twenty research associations now registered in this country, and some of these were not only carrying out research work on their own, but were also assisting research work in universities and technical colleges. One firm had no fewer than fifteen research students working in one of the universities with a view to ultimately carrying on the work in the factories. In spite of these facts they found a report by a committee of the Privy Council on scientific and industrial research which first of all regretted that we were so dependent on a few students to carry on this great work, and went on to say that there were so many difficulties in the way of getting students trained for the work that it seemed hopeless to look forward. Why should it? It did not take many millions to train students in this work, yet we could fritter away many millions on side-shows like Mesopotamia and elsewhere. It seemed the last thing we could think of, to spend money in endeavouring to make our position in this country more secure.

Manufacture of Cellulose in Jugoslavia

WRITING from Belgrade the American Vice-Consul states that cellulose of a good quality, capable of being used in the manufacture of fine grades of paper and gunpowder, is manufactured in Drvari, Bosnia, and in Gorichani, Slovenia. The plant at Drvari was founded by Dobrlin, D.D., a forest industry corporation, and by Simonius, a Swiss corporation, with an original joint capital of 6,000,000 crowns, for the purpose of obtaining cellulose from the sawdust, waste trimmings, &c., from the sawmill at Dobrlin, such waste formerly being burned or left to rot. The plant was founded in 1908, but did not pay dividends until 1912. In that year 13,380 metric tons of cellulose were obtained, and in 1913, 13,980 metric tons were produced. During the war, owing to labour shortage, the production was only 9,420 tons, 2,580 tons, 3,030 tons, 770 tons, and 200 tons for the years 1914 to 1918, respectively. In 1919 the production was 650 tons, in 1920, 1,320 tons, while the production for 1921 is expected to reach 700 tons monthly.

It is announced that SIR HENRY MANTON, glass manufacturer, is retiring, owing to advancing years, from the Birmingham City Council.

Society of Chemical Industry

Chemical Exhibition at Manchester

AT the one-day exhibition held in Manchester on Thursday in connexion with the opening meeting of the Manchester Section of the Society of Chemical Industry, Baird & Tatlock, Ltd., of Manchester, were showing "Microid" analytical balances, centrifugals, galvanometers for testing liquid resistances, viscometers, and other oil-testing apparatus. Acid-resisting porcelain and enamel, and cast-iron chemical plant lined with these materials, was exhibited by T. & C. Clark & Co., Ltd., of Wolverhampton, while the display of the British Thomson-Houston Co., Ltd., included flow meters for steam, water, oil, air, or gas. Other firms exhibiting in this section were Orme & Co., Ltd., Manchester, chemical apparatus and scientific glassware; the Lennox Foundry Co., Ltd., London, acid-resisting alloys; the Thermal Syndicate, Ltd., Wallsend-on-Tyne, works and laboratory apparatus in "Vitreosil"; and the Edison-Swan Electric Co., Ltd., Manchester, high-frequency apparatus, wireless valves, heating and cooking appliances, and special lamps for colour-matching.

Oil-burning apparatus and chemical works equipment, including automatic injectors for vertical boilers, ejectors for lifting and forcing liquids, and exhaust steam water-heaters, were seen on the stand of White's Injectors, Ltd., Manchester. Steam flow recorders formed the exhibit of George Kent, Ltd., London; the "Kek" densimeter that of the Chemical Engineering Co. (Manchester), Ltd., while electrical CO_2 instruments were exhibited by the Cambridge & Paul Scientific Instrument Co., London. F. Davidson & Co., London, were responsible for displays of micro and telephotographic apparatus, and Mr. E. H. Marsh, of Whaley Bridge, Stockport, for water and other meters, and acid-resisting apparatus.

In the Chemical Products Section, the exhibit of the British Drug Houses, Ltd., London, was divided into the following groups: Pure organic chemicals for research purposes, chemically-pure analytical reagents, indicators for volumetric analysis, and dyes and mounting media for bacteriological and microscopical uses. An exhibit of Joseph Crosfield & Sons, Ltd., Warrington, consisted of a number of intermediates and final products used mainly in compounding fine perfumery articles and for the perfuming of soap.

Commercial Motor Exhibition at Olympia

EACH year witnesses greater developments in motor transport, and in consequence each successive Olympia Commercial Motor Exhibition arouses greater interest; for it is obvious that transport by mechanical means is essential to successful business to-day.

Organised by the Society of Motor Manufacturers and Traders Ltd., this exhibition will be held from October 14th to 22nd, and will prove that Great Britain leads the world for its largest display of petrol, steam and electrical vehicles for goods and passenger transport and general utility purposes. International in character, the Exhibition is the fifth of its kind, and the exhibits will range from the little light commercial vehicle to the heaviest type of lorry. The Exhibition remains open on the above-mentioned days from 11 a.m. to 8 p.m., the price of admission being 2s., except on Saturdays, October 15th and 22nd, on which days the admission wil be 1s.

Artificial Camphor

ARTIFICIAL camphor is now being made in quantity in America from coal tar, according to Mr. C. R. De Long, chief chemist of the United States Tariff Commission. In an address delivered recently Mr. De Long said the high price of camphor during the war led to search for a substitute, with the result that triphenyl and tricresyl phosphates were introduced as substitutes for camphor in the manufacture of pyroxylin plastics. The fact that in the past Japan has enjoyed a complete monopoly of the world's supply of camphor was well known. It was extremely doubtful whether these two coal-tar products could replace camphor in pyroxylin plastics for all purposes, but they offered a means of overcoming to some degree the Japanese monopoly in camphor. The importance of the development of these camphor substitutes could not be overestimated.

British Glass Industries

Increased Production at Canning Town

AT the second general meeting of shareholders of the British Glass Industries, Ltd., held in London on Wednesday, Mr. George E. Alexander, O.B.E. (chairman and managing director), who presided, dealt at length with the various items on the balance-sheet and said he feared that the words of caution he uttered at the meeting held on January 22 last hardly prepared the shareholders for the unsatisfactory figures now before them, more particularly having regard to the optimistic estimates that were given to the shareholders at the two previous meetings. He thought they would, however, appreciate that the estimates made were based on what was existing then at the very top of the boom, and that there were, at that time, no signs of any falling off in demand.

These conditions prevailed in the glass trade longer than in most other industries, and even in December, when the Board were congratulating themselves on the existing position, it was impossible to foresee the very sudden and calamitous change that was to take place. At the meeting in January he pointed out that the Board, as reconstituted, had many difficulties to face, but that he thought the general feeling prevailed that they should be given time to endeavour to put the company on a sound manufacturing commercial basis.

They were entitled to hear what the Board had attempted to accomplish since then. The directors decided to suspend the acceptance of any fees during the anxious times through which they were passing, although the work involved, and continued to involve, constant and laborious attention. The present Board consisted of five, as compared with the old Board of ten. A large number of the creditors of the company had been seen by the secretary, and debentures had been placed with them in satisfaction of their claim to an amount of £36,500. It was found necessary to close down the Canning Town and Leeds factories, and as many economies as possible were effected while the works were standing idle.

The directors had been able to recommence operations at Canning Town, where in two furnaces since July 28 they had produced no fewer than 8½ millions of bottles and had sold and delivered from them over 5 millions of bottles. Since they restarted operations after the coal strike, they had manufactured and sold at their various glass-bottle works, including the figures he had given with regard to Canning Town, larger quantities than ever before in their existence. He could tell them that from actual figures taken out up till Saturday last they had produced over 50 million bottles, of which they had sold and delivered over 38 millions. The last week's production exceeded all others. They certainly had very keen competition to face, but he thought this would give them some evidence that the glass-bottle trade in this country was not in the forlorn condition that one might be led to suppose by the gloomy reports afloat.

Notwithstanding the economies effected and the present position of manufacture, he feared that no immediate improvement could be foreshadowed, inasmuch as the keen competition and prevailing low prices, and the heavy losses incurred by the recent coal strike, would seriously discount their efforts, and it was only right to say that undoubtedly the first figure of £3,050,000 in the balance-sheet was not represented by assets at their present-day value. This the directors had realised would necessitate some drastic treatment, and they had under consideration a scheme which, if it materialised, should, in their opinion, make the position of the shareholders much more satisfactory. He could promise them that the details would be put before them as soon as possible, and they hoped within the next three months.

Calvert Dyes, Ltd.

Statement of Affairs: List of Creditors

THE statement of affairs filed in the compulsory liquidation of Calvert Dyes, Ltd., of Steanard Lane, Mirfield, Yorks (*see* THE CHEMICAL AGE, Vol. V., p. 280), shows, as regards creditors, liabilities expected to rank £4,440, and assets valued at £4,752. The schedule of creditors includes James Livingstone, Ltd., London, £1,950; John W. Leitch & Co., Ltd., Huddersfield, £14; North Eastern Chemical Co., Ltd., Bradford, £57; and Potter's Asbestos Co., Ltd., Rochdale, £70.

From Week to Week

The full-time department of INDUSTRIAL CHEMISTRY resumed at Cardiff Technical College on Tuesday.

CRUDE PETROLEUM, amounting to seven million gallons, was imported into Swansea last week by three steamers.

The telephone number of CHAS. PAGE & CO., LTD., of 47-51, King William Street, London, E.C.4, is now Minories 2250.

MANGOLD BROTHERS, of 17, Harp Lane, London, E.C.3, announce that their telephone number has been changed to Minories 1622 and 1623.

Four lectures by DR. F. W. ASTON on atomic weights and isotopes will be delivered at 5.45 p.m. on successive Wednesdays, commencing October 12, at Battersea Polytechnic, S.W.11

Serious damage was caused by a fire on September 30 at the PETROL STORE of the British Petroleum Co., at Barkerend Road, Bradford. The building was completely destroyed, as were 2,700 gallons of petrol.

Mr. A. T. COCKING, lately a managing director of Kynoch, Ltd., and who has had a life-long experience of the chemical trade, has been elected technical director of the Staveley Coal and Iron Company, Ltd.

The Methylating Co., Ltd., 38-41, Finsbury Court, Finsbury Pavement, E.C.2, announce that in consequence of the recent modification of the Government rebate, their price for INDUSTRIAL METHYLATED SPIRIT is reduced 3d. per imperial gallon.

It is announced, as the result of further searches in the wrecked area of OPPAU, that the number of identified dead is now 373. Seventy-five bodies had not been identified at the beginning of the week, and 177 persons are still reported missing.

With reference to the song "The Multiple Engineer," sung at the Society of Chemical Industry Dinner, at Buffalo, N.Y., the words of which appeared in THE CHEMICAL AGE last week, a correspondent informs us that the song is sung to the tune of "The Son of a Gambolier."

It is announced that Mr. HERBERT BLACKBURN, who has been in charge of the Montreal laboratories of L. B. Holliday & Co., Ltd., of Huddersfield, is returning to the United Kingdom. He was an active member of the Montreal Section of the Society of Chemical Industry. Mr. Blackburn's work in Canada will be continued by Mr. Eric Lister of the Huddersfield works.

The inaugural lecture of the course of instruction in PETROLEUM TECHNOLOGY at the Sir John Cass Technical Institute will be given on Monday at 7 p.m. The lecture, which is entitled "The Geology of Petroleum," will be delivered by Mr. E. H. Cunningham Craig, and the chair will be taken by Sir Frederick Black, K.C.B.

The Badische Anilin und Sodafabrik are understood to have made an announcement to the effect that the recent EXPLOSION AT OPPAU will not in any way influence the manufacture and export of dyestuffs and other chemicals. The manufacture of nitrogen products, carried on solely at Oppau, will, however, be curtailed for some time.

EXPORTS OF PATENT FUEL from South Wales last week were over 12,000 tons greater than in the previous week, totalling 26,654, as against 14,880 tons. Half the total was shipped from Swansea. There were several large consignments, including 7,000 tons from Cardiff to Karachi, 5,030 tons from Swansea to Venice, and 3,158 tons from the same port to Antwerp.

The Third Committee of the League of Nations has adopted two proposals by Lord Robert Cecil to address an appeal to the *savants* of the world that they should make known all DISCOVERIES CONCERNING POISON GAS and other means of war, and to invite delegates to enter with enthusiasm and conviction upon active propaganda for disarmament in their respective countries.

THE ANNUAL DINNER of the Society of Chemical Industry was held last night at the Connaught Rooms, Great Queen Street, W.C. Among the guests who had accepted invitations to be present were the President of the Institute of Chemistry, the President of the Institution of Mechanical Engineers, the Director of the National Physical Laboratory, Sir Frank Heath, Sir William Tilden, and Sir Alfred D. Hall.

IMPORTS FROM GERMANY into this country during August show an increase in value of nearly £158,000 on the preceding month's figures. The increase in the import of alizarine of 33 cwt. in July to 4,157 cwt. in August was responsible for the greater portion of the £37,019 under the heading of dyes and dyestuffs. Glassware shows an increase of £12,977. Scientific instruments were down by £24,689.

A deputation from Woolwich waited upon Lieut-Colonel Stanley, Financial Secretary to the War Office, at the War Office, on October 1, to protest against the CONTINUED DISCHARGE of 300 men a week from the Arsenal. At the close of the conference, Sir Kingsley Wood, M.P., stated in reply to a Press representative that the matter of the Woolwich discharges was one for the Cabinet, and would no doubt be considered at an early date by the Cabinet Unemployment Committee.

The Prince of Wales, who is taking the chair at the meeting of the BRITISH EMPIRE EXHIBITION Committee at the Mansion House at 3 p.m. on October 12, is inviting all the Lord Mayors, Lord Provosts, Provosts and Mayors, together with representatives of Chambers of Commerce and trade associations, to be present at the meeting. The Prince is anxious that an early start should be made on the preliminary work in connexion with this great enterprise, because such work would during the coming winter provide employment for several thousands.

Over 18,000 tons of CRUDE OIL were imported into Swansea last week for the Anglo-Persian Oil Refining Co. Great things are expected from the oil industry, and the imports up to September greatly exceeded those for the whole of last year. The port is rapidly becoming a recognised centre for the distribution of oil fuel. During the week-end the steamship "British Major" left for Spezzia, Italy, with 5,000 tons of oil for bunkering purposes. This marks the first step in the Anglo-Persian Co.'s policy of establishing agencies for fuel oil distribution all over the Continent.

At the GENERAL MEETING of the Mining Institute of Scotland to be held in the Heriot Watt College, Chambers Street, Edinburgh, to-day (Saturday), the following papers will be open for discussion: "Physical Work and the Human Machine," by Professor H. Briggs; "The Beam Electric Head-Lamp," by Mr. William McNaught; and "A New Method of Measuring Ventilating Resistances, with special reference to the Operation of Mine Fans in Combination," by Mr. David Penman. A paper will be read by Mr. James Cooper on "Measurements of Air Velocities and the Testing of Anemometers."

A fire broke out at the SALT WORKS at Stafford of Messrs. Chance & Hunt, Ltd., the Common, on September 29. The fire originated in a drying shed, of brick and wood, standing in the centre of a line of similarly constructed buildings. The wood roof and side stagings, which had had many dressings of tar and pitch, burned with fury and the roof soon fell in. A low water pressure handicapped the fire brigade, but eventually the hose pipes were connected with a reservoir of salt brine and the outbreak was thus localised. The damage done to the drying shed was considerable.

A British STANDARD SPECIFICATION has been issued by the British Engineering Standards Association for creosote for the preservation of timber. The specification covers the requirements of creosote suitable for the treatment of railway sleepers and for telegraph, telephone, and hangar poles and similar purposes. The clauses of the specification include a description of the substance and limits for specific gravity, fluidity, water content, distillation, tar acids, and matter insoluble in benzol. These are followed by an addendum covering the supply of Scotch creosote and appendices giving the necessary tests. This subject has engaged the activities of the Association for some time, and the committee under the chairmanship of Mr. W. W. Grierson (engineer-in-chief of the Great Western Railway) has had the co-operation of the following Government Departments and industrial and scientific organisations, in addition to a number of railway companies: War Office, Air Ministry, Government Laboratory, National Physical Laboratory, General Post Office, Association of British Chemical Manufacturers, Institute of Chemistry of Great Britain and Ireland, Royal Aeronautical Society. The specification can be obtained from the Secretary of the British Engineering Standards Association, 28, Victoria Street, London, S.W.1, price 1s. 2d., post free.

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Abstracts of Complete Specifications

168,415. EVAPORATORS. H. Fothergill, 3, Central Buildings, Westminster, London, S.W.1. Application dates, June 2 and October 27, 1920.

In the usual method of constructing evaporators having steam coils the ends of the coils are brazed to hollow coupling pieces which extend into the inlet and outlet headers and are secured by external nuts. This arrangement involves difficulties when it is desired to remove one or more of the steam coils, and the object is to provide a coupling member which allows the coils to be readly detached. The evaporator is shown in sectional plan with one of the steam coils connected at one end to the inlet header 3, and at the other end to the water-drainage header 4. The end 5*a* of the coil is secured

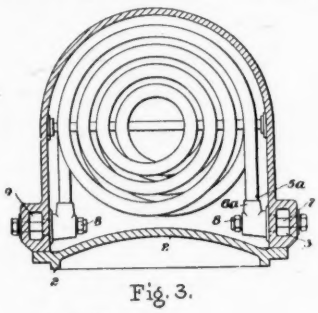

Fig. 3.

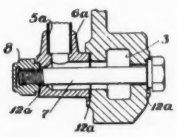

Fig. 4.

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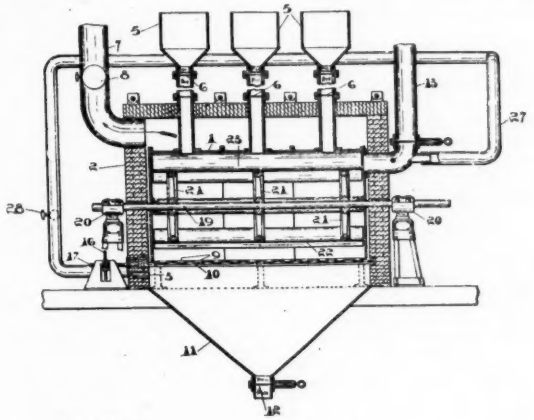
in the branch 6*a* of the coupling member, and the latter is secured to the side of the steam conduit 3 by means of a bolt 7 passing completely through both parts, and provided with a tightening nut 8. Suitable washers 12*a* are provided at the joints. The steam coil may be removed by opening the door 2 of the evaporator and withdrawing the bolt 7. The lower end of the conduit 3 may be partitioned off, so that the hot drainage water only may be passed through the lowest coil from the conduit 4 to the conduit 3, and its heat utilised in the bottom of the evaporator. The evaporator may be surmounted by a steam dome for the steam generated in the evaporator, having a baffle which intercepts water and delivers it to a passage leading to the base of the evaporator.

168,434. REDUCTION OF METALLIC OXIDE ORES, PROCESS FOR. J. W. Moffat, 366, Sackville Street, Toronto, and W. F. Sutherland, 32, Columbine Avenue, Toronto, Canada. Application date, June 8, 1920.

The object is to reduce metallic oxide ores in a granular form, and to produce a metallic product in a finely divided condition, which may be handled in troughs, pipes, conveyors, &c., and finally delivered to a electric furnace for fusion. The reduction is effected in a stationary horizontal cylinder 1 into which the ore is charged from a number of hoppers 5 to distribute it over the length of the chamber. Each hopper is provided with two sliding gates 6, so that the charge may be fed without admitting air to the retort. Apertures 3 are provided in the casing 2 for heating burners, and the combusion products are drawn off through a flue 7. The ore is reduced by subjecting it to the action of reducing gas while it is being continually lifted and allowed to fall through the gas. For this purpose a shaft 19 extends through the chamber and is supported on bearings 20. It is provided with a series of radial arms 21 carrying a number of longitudinal trough-shaped rabbles which extend from end to end of the casing. These troughs are curved in such a manner as to lift as large a proportion of the material as possible to the top of the chamber before allowing it to fall. The reduction process requires the presence of a considerable proportion of carbon monoxide in the gases, so that the outlet gases in the flue 13 have a considerable calorific value. These gases may be conducted through a pipe 27 to the burner apertures 3. The bottom of the chamber is provided with a number of discharge openings 9 controlled by a sliding gate 10, operated by a hand wheel 16. The reduced material is discharged into an airtight bin 11, and thence through an airtight gate 12. In this process lime may be added as a flux after reduction of the charge and just before its discharge. The temperature in the chamber must be kept



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sufficiently low to prevent agglomeration of the reduced ore and resulting difficulty in discharging. This temperature should be about 750°C. to 800°C.

168,447. INTERMEDIATE PRODUCTS AND NEW COLOURING MATTERS, MANUFACTURE AND PRODUCTION OF, AND THEIR APPLICATION IN DYEING AND PRINTING. J. Y Johnson, London. (From Badische Anilin & Soda Fabrik, Lugwigshafen-on-Rhine, Germany.) Application date, June 16, 1920.

Alpha-naphthoquinone is used as the starting substance. If it is heated in the presence of water, naphthohydroquinone is obtained, and also a yellow crystalline condensation product which is used in the manufacture of dyestuffs. This condensation product may be treated with acid or neutral reducing agents, which convert it into a green reduction product, or the naphthohydroquinone also produced in the above reaction may be employed as the reducing agent by prolonging the heating for several hours at 150°C. The product is insoluble in water, and organic solvents, and may be used in preparing pigments or paints. The product may be reduced further by alkaline reducing agents when a yellow vat is obtained which gives extremely fast green shades on vegetable or animal fibres. Several examples of the production of these substances are given, and also details of their use in dyeing and printing.

168,482. REMOVING SULPHUR FROM GASES, PROCESS FOR. South Metropolitan Gas Co., E. V. Evans, H. Hollings and H. Stanier, 709, Old Kent Road, London S.E.15. Application date, July 9, 1920.

When benzol is extracted from coal gas by washing with an oil such as creosote, carbon bisulphide and thiophen are also partly extracted at the same time, and it is now found that the proportion of the latter extracted varies with the proportion of benzol in the oil. This fact is made use of in the extraction of sulphur compounds other than sulphuretted hydrogen. The gas is freed from sulphuretted hydrogen and carbon bisulphide, and then passed through creosote oil containing sufficient benzol to be in equilibrium with the gas—*i.e.*, about 5·5 to 6 per cent. by volume of benzol at ordinary temperatures. If the gas is passed at a rate of 2,000,000 cubic ft. per 24 hours through a washer of 1,200 gallons capacity, and the oil-benzol mixture is passed through in the opposite direction at the rate of 2,500 gallons per 24 hours, it is found that about 7 grains of sulphur (as thiophen and other sulphur compounds) are extracted per 100 cubic ft. of gas. In a modification, the gas may be first washed with benzol and then with creosote oil, or creosote oil only may be used in the washer while benzol vapour is introduced into the gas. If an oil inert to sulphuric acid is used, the thiophen may be removed from it by sulphonating with sulphuric acid of about 60–85 per cent. strength at 30°C.–90°C. To render the process cyclic, the benzol and thiophen may be distilled from the oil and the vapour passed

through sulphuric acid under the above conditions to extract the thiophen, so that the benzol may be condensed and used again.

168,504. REMOVING HYDROGEN SULPHIDE FROM GASES, PROCESS FOR. South Metropolitan Gas Co., E. V. Evans and H. Stanier, 709, Old Kent Road, London, S.E.15. Application date, July 29, 1920.

This process for removing hydrogen sulphide from gases, more particularly coal gas, depends upon the reduction by the hydrogen sulphide of certain organic dyestuffs and their subsequent oxidation by air or oxygen. This cycle can be repeated a sufficient number of times before the dyestuff becomes ineffective, to render the process commercially practicable. The compound used is preferably soluble in a suitable medium in its oxidised and/or reduced states. Suitable dyestuffs are certain of the azine, thiazine, oxazine, triphenylmethane and indigoid compounds, indamines and indophenols, *e.g.*, methylene blue, methylene violet, Meldola's blue, indigo carmine, and the sodium salts of the sulphonic-acid derivative of certain of these dyes. The medium used may be water, water and pyridine, pyridine, quinoline or the like. A basic catalyst is sometimes necessary to accelerate the reduction, *e.g.*, metallic oxides or hydroxides, such as those of titanium, iron, and manganese, or organic bases such as pyridine or quinoline. In an example coal gas is freed from tar and ammonia and washed with a saturated solution of methylene blue in water containing 20 per cent. of pyridine. A small proportion of benzene is also added to prevent absorption of light oils from the gas. The washing solution becomes pale violet in colour when completely reduced and it may then be re-oxidised and the hydrogen sulphide recovered by passing air through it. The pyridine acts as the catalyst in this example. Details are also given of the use of methylene violet as an absorbent.

168,535. RETORTS, AND APPARATUS IN CONNEXION THEREWITH FOR THE PRODUCTION OF MIXED GASES. F. H. Robinson, "Datcha," Bilton Lane, Harrogate, Yorks. Application date, October 2, 1920.

The apparatus is for distilling coal in retorts and then transferring the residue to a producer where water gas is generated and subsequently mixed with the coal gas. A number of horizontal retorts are mounted in a setting and surrounded by the usual heating flues, but only one end of each retort is accessible from the outside of the setting. The other end of each retort opens into a vertical chamber immediately above the producer, so that the coke may be pushed out of each retort directly into the producer. The coal gas is drawn off from the retorts from the outer ends. Air for the blow period of the producer is admitted under pressure below the grate, and may also be supplied to the heating flues to complete the combustion of the gases in them. Steam for the run period is also admitted below the grate and the water gas produced passes through the retorts and mixes with the coal gas. The inert gases produced during the blow period are drawn off through an outlet pipe arranged just above the producer, but below the retorts, so that they do not mix with the coal gas, while the position of the outlet also prevents loss of coal gas.

168,551. GRINDING OR CRUSHING MACHINES. W. E. Trent, 908, G. Street, Washington, D.C., U.S.A. Application date, December 1, 1920.

A horizontal rotary grinding cylinder is supported in bearings at its ends and is provided at one end with a projecting scoop pipe which dips into a supply trough at each rotation and takes up a fresh charge of material. The cylinder contains a number of grinding rods extending throughout its length and of comparatively large diameter. A number of similar auxiliary grinding cylinders are arranged around the main cylinder in a circle and parallel to it. These cylinders contain smaller grinding rods to complete the grinding of the material. Each of the auxiliary cylinders is connected by a separate pipe to the outlet end of the main cylinder, so that it receives a charge of material once in each revolution. The material may be carried through the main and auxiliary chambers by a current of air.

NOTE.—Abstracts of the following specifications which are now accepted appeared in THE CHEMICAL AGE when they became open to inspection under the International Convention: 144,278 (United Filters Corporation), relating to pressure filters of the leaf type, *see* Vol. III., p. 188; 144,306 (American Smelting & Refining Co.), relating to obtaining sulphur from sulphur dioxide, *see* Vol. III., p. 189; 146,251 (R. H. Brownlee), relating to cracking and distilling hydrocarbon oils, *see* Vol. III., p. 321; 148,122 (L. Hackspill and C. Staehling), relating to alkali metals and their alloys, *see* Vol. III., p. 455; 148,892 (Deutsche Erdol Akt.-Ges.), relating to conversion of hydrocarbons into fatty acids, *see* Vol. III., p. 518; 151,631 (S. Naismith), relating to basic open-hearth furnaces, *see* Vol. III., p. 690.

International Specifications not yet Accepted

167,462-3. PURIFYING OILS AND FATS. N. Goslings, 104, Berg en Dalscheweg, Nymegen, Holland. International Convention date, August 3, 1920.

167,462. The free fatty acids in oils and fats are eliminated by adding a base which precipitates them as insoluble soaps. The base is suspended or dissolved in a saturated solution of a salt.

167,463. Addition to 167,462. In the above process, the separation of the soap is facilitated by adding a small quantity of an acid of high molecular weight, and the operation is effected *in vacuo*.

167,464. ROASTING FURNACES. Manufactures de Produits Chimiques du Nord Etablissements Kuhlmann, 117, Boulevard Haussmann, Paris. International Convention date, August 5, 1920.

Ore is admitted from a hopper 9 through a passage 14 on to helical guides 27, 28 attached to the vertical shaft 4, which

FIG.1.

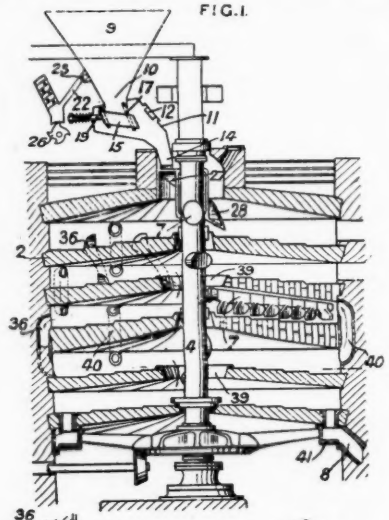
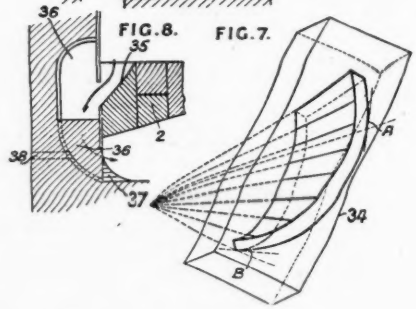


FIG.8. FIG.7.



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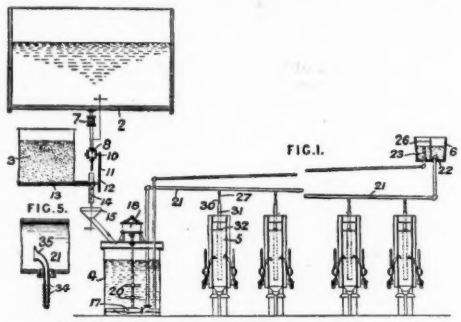
distribute it at regular intervals on the upper surface of the hearth 2. The superposed hearths are in the form of annular steps with a conical under surface, and rotating rabble arms 7 are provided between them. The rabble teeth are of ploughshare shape, as illustrated, and are arranged to enter the material vertically and leave it at approximately the angle of repose. Each tooth operates in its own annular track. To

prevent clogging of the material which is discharged from the hopper, a reciprocating member 15 is provided, suspended by links 17 from the casing 11. The member 15 carries a spring-pressed member 19 which is subjected to periodic blows from the weighted lever 22 pivoted at 23 and lifted and released by the rotating cam 26. The hearths are interconnected alternately by peripheral and central ore passages 36, 39. The passages 36 are helical and the hearth adjacent to them is inclined at 35, while a raised portion 37 is adjacent to the exit. The ore is finally delivered to an annular passage 41 and thence to outlets in the periphery. The hot gases pass upwards through the apparatus by means of connecting passages 40.

167,469. ELECTROLYSIS. Hooker Electrochemical Co., 25, Pine Street, New York (assignees of A. H. Hooker, Niagara Falls, N.Y., U.S.A.). International Convention date, August 5, 1920.

The dilution which occurs in an electrolytic cell during electrolysis is compensated by the automatic addition of solid salt to keep the solution saturated. Brine passes from a tank 2 through a valve 7 and rotary measuring device of the Roots blower type 8 to a screen 15 and tank 4. The device 8 is geared by toothed wheels 10, 12 to a worm conveyor 13 in a hopper 3 containing solid salt, so that solid salt is supplied to the screen 15 in the proper proportion to keep the solution



167,469

saturated. A motor 18 operates a stirring device 20, and also a centrifugal pump 17 which delivers the solution through a pipe 21 to the cells 5. Glass branch pipes 30 and earthenware tubes 32 are provided, the latter dipping below the liquid level in the cells. The pipe 21 is inclined so as to equalise the head of liquid at each branch pipe. In an alternative form, the branch pipes are provided with curved inlets 35 projecting into the pipe 21, and with tapered nozzles 34. The end of the pipe 21 terminates in a pipe 22 in a tank 6, which is provided with a partition 26 and an overflow pipe 23. The pressure in the pipe 21 is varied by varying the height of the overflow 23

LATEST NOTIFICATION.

169,460. Manufacture of dyestuffs of the acridine series. Akt. Ges. für Anilin-Fabrikation. April 22, 1915.

Specifications Accepted, with Date of Application

141,714. Tanning materials and method of producing same. A. Koetzle. April 12, 1919.

144,657. Tanning extracts or agents, Manufacture and production of readily-soluble. Badische Anilin & Soda Fabrik. January 29, 1914.

144,677. Tanning extracts or agents, Manufacture and production of readily-soluble. F. Hassler. December 19, 1913.

145,038. Transforming ammonia into a salt for use as a fertiliser, Process for. J. Y. Johnson (Badische Anilin & Soda Fabrik). June 14, 1920.

145,059. Oxides of nitrogen from ammonia, Production of—by catalytic oxidation. J. Y. Johnson (Badische Anilin & Soda Fabrik). June 15, 1920.

145,743. Alkyl anilines, Process for the production of. E. I. Du Pont de Nemours & Co. July 7, 1917.

146,289. Cyanamide derivatives of alpha-halogenated acids, Manufacture of. W. Carpmael (Farbenfabriken vorm. F. Bayer & Co.). June 24, 1920.

146,410. Zinc sulphide, Manufacture of. C. Clerc and A. Nihoul. May 20, 1919.

146,498. Artificial resins, Manufacture and production of. J. Y. Johnson (Badische Anilin & Soda Fabrik). July 5, 1920.

148,242. Manures, Manufacture of—by breaking up phosphates with nitric acid. Chemische Fabrik Rhenania and Dr. G. A. Voerkelius. May 31, 1918.

168,927. Ores, Concentration of—by flotation. E. Edser and L. A. Wood. March 20, 1920.

168,939. Gas-producers. W. Pickard and D. R. Dobson. May 4, 1920.

168,951. Gas-generator. S. Moore. May 11, 1920.

169,003. Plastic compositions, Production of. Usher-Walker, Ltd., and C. E. Soane. June 14, 1920.

169,025. Toluene, Manufacture of chlorinated derivatives of. British Dyestuffs Corporation, Ltd., A. G. Green and D. A. Clibbens. June 23, 1920.

169,063. Hydrocarbon vapours, Electrical apparatus for the electro-chemical treatment of. L. B. Cherry. July 20, 1920.

169,101. Coke ovens. L. Wilputte. September 22, 1920.

169,111. Peat fuel, Preparation of. S. C. Davidson. November 1, 1920. Addition to 159,996.

169,130. Automatic analysis of gases, Recording analysing apparatus for. S. A. S. Krogh and P. H. Pedersen. May 10, 1920.

Applications for Patents

Abbott Laboratories. Production of esters of aromatic acids. 25,593. September 27.

Adelantado, L. Manufacture of superphosphates and manure. 26,042. October 1.

Akt.-Ges. für Analin-Fabrikation & A. G. Blaxham. Manufacture of new ortho-oxy-azo dye-stuffs. 25,586. September 27.

American Cellulose & Chemical Manufacturing Co., Ltd., & British Cellulose & Chemical Manufacturing Co., Ltd. Treatment of cellulose derivatives. 25,562. September 27.

Brown, C. Ovens. 24,773. September 19.

Dreaper, W. P. Manufacture of artificial silk, &c. 25,320, 25,321. September 24.

Freeth, F. A. Production of ammonium chloride and sodium carbonate. 25,862. September 30.

Hutchins, T. W. S. Apparatus for distillation of carbonaceous materials. 26,023. October 1.

Marks, E. C. R. (Abbott Laboratories.) Production of esters of aromatic acids. 25,593. September 27.

National Aniline & Chemical Co., Inc. Seal for containers. 24,799. September 19. (United States, September 18, 1920.)

Nicholls, F. N. Process of making liquid fuel from peat. 25,181. September 22.

Nielsen, H. Distillation of carbonaceous materials. 24,945. September 20.

Pauling, H., & Wetzlau, J. S. Method of leaching ores with nitric acid. 25,818. September 29.

,, Method of transforming into sulphates, metals and alloys insoluble in sulphuric acid. 25,937. September 30.

Plauson, H., & Plauson's (Parent Co.), Ltd. Manufacture of colloidal sulphur. 25,219. September 23.

Plauson's Forschungsinstitut Ges. Process for manufacture of soaps. 26,008. October 1. (Germany, November 3, 1920.)

Remfry, F. G. P. Treatment of petroleum, &c. 25,684. September 28.

Roucka, E. Device for composing of changeable physical or chemical qualities or quantities. 25,461. September 26.

Schidrowitz, P. Process for vulcanisation of rubber. 25,383. September 24.

Soc. Ricard, Allenet, et Cie. Process for purifying saccharine juices, &c. 24,928. September 20. (France, January 6.)

Techno-Chemical Laboratories, Ltd. Centrifugal separating-machines. 25,691. September 28.

Recent Wills

Dr. A. J. Cohen-Stuart, of Westover, West Heath Road, Hendon, N.W., and The Hague, Holland, and of Billiter Street, E.C., a director of the Royal Dutch Petroleum Co., the Asiatic Petroleum Co., Ltd., and The Shell Transport & Trading Co., Ltd. £88,090

Mr. D. Brown, of Willowbrae House, Willowbrae Road, Edinburgh, manufacturing chemist, senior partner in the firm of Messrs. J. F. Macfarlan & Co., of Edinburgh, and of Moor Lane, London, E.C., an authority on opium and its derivatives £67,822

Mr. W. F. De Bois Maclaren, of Armadale, Clyander, Dumbartonshire, chairman of the Glen Bervie Rubber Co., Ltd., the Pryre Rubber & Cocoanut Plantations, Ltd., the Rubber Estate Agency, Ltd., and the Gerdang Central Plantations, Ltd..... £129,374

Mr. T. Knapman, J.P., of Dennysmead, Cowley Road, and Fore Street, Exeter, oil and colour merchant £8,556

Monthly Market Report and Current Prices

Our Market Report and Current Prices are exclusive to THE CHEMICAL AGE, *and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. The weekly report contains only commodities whose values are at the time of particular interest or of a fluctuating nature. A more complete report and list are published once a month. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers; those interested in close variations in prices should study the market report.*

British Market Report

THURSDAY, October 6, 1921.

Generally speaking, the trend of prices has again been upward during the past week and the demand for many imported products remains active. As far as prices generally are concerned, it would almost appear that we have turned the corner and, as we mentioned last week, many Continental producers, whose competition is usually severe, are heavily committed for some distance ahead and have advanced their price. As the Safeguarding of Industries Act becomes more clearly realised, determined opposition is developing, but it must necessarily be some time before amelioration of the Act may be expected.

There is a fair export demand, but the effect of the above-mentioned legislation will be to divert more and more trade to Continental centres.

General Chemicals

ACETONE is higher in price and stocks are scarce.

ACID ACETIC is in strong demand; the price is again firmer and a further improvement is not unlikely.

ACID CITRIC is only in moderate demand and the price is firm.

ACID FORMIC is dearer, but the demand remains rather slow.

ACID OXALIC has strongly advanced in price and stocks pass freely into consumption.

ACID TARTARIC has been uninteresting.

BLEACHING POWDER is still slow of sale; the price is nominally unchanged.

COPPER SULPHATE.—The actual business passing is purely nominal, but, on the whole, the tendency is regarded as slightly healthier.

FORMALDEHYDE is a steady market and as stocks are reduced a higher price is expected.

IRON SULPHATE.—There is no change to report.

LEAD ACETATE has been more freely offered during the past week and prices are inclined to be slightly easier.

LEAD NITRATE remains in fair demand with price unchanged.

LITHOPONE is in poor demand and low prices seem to have little effect in stimulating consumption.

POTASSIUM CARBONATE continues to favour buyers.

POTASSIUM CAUSTIC.—The market remains overstocked and purchases can be made below the general quotations.

POTASSIUM CHLORATE is inclined to be easier on Continental offering. The demand is small.

POTASSIUM PRUSSIATE is very firm for early delivery and manufacturers are not eager to take forward commitments.

SODIUM ACETATE is again higher in price and in good demand.

SODIUM BICHROMATE maintains its healthier tendency and the second-hand market is slowly but surely approaching makers' figures.

SODIUM CAUSTIC is perhaps a little better, but no real improvement can yet be detected.

SODIUM NITRITE is slow of sale, but the price is firmly maintained.

SODIUM PHOSPHATE is unchanged.

SODIUM PRUSSIATE is very scarce and has experienced a strong upward movement.

SODIUM SULPHIDE remains unchanged.

Coal Tar Intermediates

Business continues on quiet lines, but inquiries are received in fair volume and the business concluded is gradually but slowly reaching larger dimensions.

ALPHA NAPHTHYLAMINE continues in quiet demand at recent figures.

ANILINE OIL AND SALT have been inquired for both on home and export account, and far Eastern markets are showing considerably more interest in these products than has been the case of late.

ANTHRAQUINONE continues in small demand.

BETA NAPHTHOL is quiet and the price remains unchanged.

DIMETHYLANILINE continues in request at recent figures.

DIPHENYLAMINE.—A fair business has been passing at last quotations.

H. ACID is unchanged.

PARANITRANILINE continues firm.

RESORCINE has been inquired for and the amount available at reasonable quotations is not excessive.

SALICYLIC ACID is steady.

Coal Tar Products

The market generally for coal tar products is dull with the possible exception of benzol and solvent naphtha. Both of these products are in very strong demand and very litttle is now obtainable for delivery this year. Creosote oil is showing signs of weakness and there are sellers ready to discount the market for forward delivery.

90 PER CENT. BENZOL is being quoted in London at 3s. on rails, and 2s. 9½d. to 2s. 10d. in the Midlands.

PURE BENZOL is quoted at 3s. 6d. a gallon on rails.

CREOSOTE OIL is slightly weaker and is worth 7¾d. on rails in the North, and 8¼d. to 8½d. in the South.

CRESYLIC ACID is dull and is quoted 2s. 3d. on rails for dark, and 1s. 10d. to 2s. for pale.

SOLVENT NAPHTHA is in good demand and is worth about 2s. 9d. on rails in the Midlands, and 3s. in the South.

NAPHTHALENE is very quiet, crude qualities being worth from £5 to £8 per ton, while refined are worth from £15 to £17 per ton.

PITCH.—The market is dull and very little business is taking place largely owing to German competition.

Sulphate of Ammonia

There is a good demand for export and prices are firm.

French Market Report

Business has been somewhat more active, and there are evidences that some of the re-sale parcels have now been disposed of. The market is firmer with an upward tendency.

ACETONE, 550 frs.
ACETIC ACID, 80 per cent., 350 frs.
ACID LACTIC, 230 frs.
ACID OXALIC, 415 frs.
AMMONIUM CARBONATE, 225 frs.
AMMONIUM PHOSPHATE, 425 frs.
BORAX CRYSTALS, 150 frs.
ALUMINA SULPHATE, 14 per cent., 75 frs.; 17-18 per cent., 88 frs.
COPPER SULPHATE, 135 frs.
CALCIUM CHLORIDE, 42. frs.
CREAM OF TARTAR, 775 frs.
FORMALDEHYDE, 6 frs.
LEAD NITRATE, 335 frs.
LEAD ACETATE, 280 frs.
POTASSIUM BICHROMATE, 425 frs.
POTASSIUM YELLOW PRUSSIATE, 575 frs.
POTASSIUM PERMANGANATE, 10 frs., 75 per kilo.
SODIUM ARSENIATE, 58-60, 220 frs.
SODIUM BICARBONATE, 100 frs.
SODIUM BICHROMATE, 275 frs.
SODIUM HYPOSULPHITE, 85 frs.
SODIUM NITRITE, 310 frs.

SODIUM SULPHIDE CONC., 120 frs.
SODIUM PHOSPHATE, 135 frs.
All the above quotations are per 100 kilos unless otherwise stated.

German Market Report

This market has been extremely active and practically all the quotations show advantage. The majority of large works are now fully sold for a considerable period ahead, and are disinclined to accept fresh business, except at higher limits.

ACID OXALIC, 18 marks.
BORAX CRYSTALS, 11 marks.
COPPER SULPHATE, 10 marks.
FORMALDEHYDE, 40 per cent., 22 marks.
HYDROGEN PEROXIDE, 30 per cent., 28 marks.
LITHOPONE, 6 marks 50.
POTASSIUM PERMANGANATE, 28 marks.
SODIUM CAUSTIC, 8·50 marks.
SODA CRYSTALS, 95 marks per 100 kilos.
SODIUM SULPHIDE, 60-65 per cent., 10 marks.
ZINC CHLORIDE SOLID, 5 marks 50.
All the above quotations are per kilo unless otherwise stated

Current Prices

Chemicals

	per	£	s.	d.		£	s.	d.
Acetic anhydride	lb.	0	2	1	to	0	2	2
Acetone oil	ton	87	10	0	to	90	0	0
Acetone, pure	ton	90	0	0	to	95	0	0
Acid, Acetic, glacial, 99-100%	ton	60	10	0	to	62	10	0
Acetic, 80% pure	ton	45	0	0	to	48	0	0
Arsenic	ton	95	0	0	to	100	0	0
Boric, cryst	ton	65	0	0	to	68	0	0
Carbolic, cryst. 39-40%	lb.	0	0	6½	to	0	0	7
Citric	lb.	0	2	5	to	0	2	6
Formic, 80%	ton	65	0	0	to	67	10	0
Gallic, pure	lb.	0	3	9	to	0	4	0
Hydrofluoric	lb.	0	0	8½	to	0	0	9
Lactic, 50 vol.	ton	43	0	0	to	45	0	0
Lactic, 60 vol.	ton	46	0	0	to	48	0	0
Nitric, 80 Tw.	ton	38	0	0	to	40	0	0
Oxalic	lb.	0	0	8½	to	0	0	9
Phosphoric, 1.5	ton	45	0	0	to	47	0	0
Pyrogallic, cryst	lb.	0	7	3	to	0	7	6
Salicylic, Technical	lb.	0	1	2	to	0	1	3
Salicylic, B.P.	lb	0	1	6	to	0	1	7
Sulphuric, 92-93%	ton	8	0	0	to	8	10	0
Tannic, commercial	lb.	0	3	6	to	0	3	9
Tartaric	lb.	0	1	5	to	0	1	6
Alum, lump	ton	18	0	0	to	18	10	0
Alum, chrome	ton	37	10	0	to	40	0	0
Alumino ferric	ton	9	0	0	to	9	10	0
Aluminium, sulphate, 14-15%	ton	12	0	0	to	13	0	0
Aluminium, sulphate, 17-18%	ton	15	0	0	to	16	0	0
Ammonia, anhydrous	lb.	0	2	0	to	0	2	2
Ammonia, .880	ton	43	0	0	to	45	0	0
Ammonia, .920	ton	30	0	0	to	32	10	0
Ammonia, carbonate	lb.	0	0	4	to		—	
Ammonia, chloride	ton	60	0	0	to	65	0	0
Ammonia, muriate (galvanisers)	ton	45	0	0	to	47	10	0
Ammonia, nitrate	ton	55	0	0	to	60	0	0
Ammonia, phosphate	ton	85	0	0	to	90	0	0
Ammonia, sulphocyanide	lb.	0	3	0	to	0	3	0
Amyl acetate	ton	150	0	0	to	160	0	0
Arsenic, white, powdered	ton	38	0	0	to	40	0	0
Barium, carbonate, 92-94%	ton	12	10	0	to	13	0	0
Barium, chlorate	lb.	0	0	11	to	0	1	0
Chloride	ton	15	0	0	to	16	0	0
Nitrate	ton	42	10	0	to	45	0	0
Barium Sulphate, blanc fixe, dry	ton	26	0	0	to	28	0	0
Sulphate, blanc fixe, pulp	ton	16	0	0	to	16	10	0
Sulphocyanide, 95%	lb.	0	1	6	to	0	1	0
Bleaching powder, 35-37%	ton	14	0	0	to		—	
Borax crystals	ton	31	0	0	to	32	0	0
Calcium acetate, Brown	ton	8	0	0	to	9	0	0
,, Grey	ton	10	0	0	to	11	0	0
Calcium Carbide	ton	22	0	0	to	23	0	0
Chloride	ton	12	10	0	to	13	0	0
Carbon bisulphide	ton	60	0	0	to	62	0	0
Casein, technical	ton	85	0	0	to	90	0	0
Cerium oxalate	lb.	0	3	6	to	0	3	9
Chromium acetate	lb.	0	1	1	to	0	1	3
Cobalt acetate	lb.	0	11	0	to	0	11	6
Oxide, black	lb.	0	16	0	to		—	
Copper chloride	lb.	0	1	3	to	0	1	6
Sulphate	ton	28	10	0	to	29	10	0
Cream Tartar, 98-100%	ton	135	0	0	to	140	0	0

	per	£	s.	d.		£	s.	d.
Epsom salts (*see* Magnesium sulphate)								
Formaldehyde 40% vol.	ton	95	0	0	to	97	0	0
Formusol (Rongalite)	lb.	0	3	9	to	0	4	0
Glauber salts, commercial	ton	5	5	0	to	5	10	0
Glycerine, crude	ton	70	0	0	to	72	10	0
Hydrogen peroxide, 12 vols.	gal.	0	2	8	to	0	2	9
Iron perchloride	ton	45	0	0	to	50	0	0
Iron sulphate (Copperas)	ton	4	0	0	to	4	5	0
Lead acetate, white	ton	48	0	0	to	50	0	0
Carbonate (White Lead)	ton	43	0	0	to	46	0	0
Nitrate	ton	48	10	0	to	50	10	0
Litharge	ton	35	10	0	to	36	0	0
Lithopone, 30%	ton	26	0	0	to	28	0	0
Magnesium chloride	ton	12	0	0	to	13	0	0
Carbonate, light	cwt.	2	10	0	to	2	15	0
Sulphate (Epsom salts commercial)	ton	10	10	0	to	11	10	0
Sulphate (Druggists')	ton	15	10	0	to	17	10	0
Manganese, Borate	ton	70	0	0	to	75	0	0
Sulphate	ton	70	0	0	to	75	0	0
Methyl acetone	ton	85	0	0	to	90	0	0
Alcohol, 1% acetone	ton	105	0	0	to	110	0	0
Nickel sulphate, single salt	ton	65	0	0	to	66	0	0
Nickel ammonium sulphate, double salt	ton	67	0	0	to	68	0	0
Potash, Caustic	ton	33	0	0	to	33	10	0
Potassium bichromate	lb.	0	0	9	to		—	
Carbonate, 90%	ton	31	0	0	to	33	0	0
Chloride	ton	36	0	0	to	38	0	0
Chlorate	lb.	0	0	5	to	0	0	5½
Meta bisulphite, 50-52%	ton	120	0	0	to	125	0	0
Nitrate, refined	ton	45	0	0	to	47	0	0
Permanganate	lb.	0	1	2	to	0	1	4
Prussiate, red	lb.	0	2	4	to	0	2	6
Prussiate, yellow	lb.	0	1	2½	to	0	1	3
Sulphate, 90%	ton	31	0	0	to	33	0	0
Salammoniac, firsts	cwt	3	5	0	to		—	
Seconds	cwt	3	0	0	to		—	
Sodium acetate	ton	28	0	0	to	30	0	0
Arsenate, 45%	ton	60	0	0	to	62	0	0
Bicarbonate	ton	10	10	0	to	11	0	0
Bichromate	lb.	0	0	6½	to	0	0	7
Bisulphite, 60-62%	ton	27	10	0	to	30	0	0
Chlorate	lb.	0	0	4½	to	0	0	5
Caustic, 70%	ton	24	0	0	to	24	10	0
Caustic, 76%	ton	25	10	0	to	26	0	0
Hydrosulphite, powder, 85%	lb.	0	2	3	to	0	2	6
Hyposulphite, commercial	ton	15	0	0	to	16	0	0
Nitrite, 96-98%	ton	40	0	0	to	42	0	0
Phosphate, crystal	ton	23	10	0	to	25	10	0
Perborate	lb.	0	1	6	to	0	1	7
Prussiate	lb.	0	0	8½	to	0	0	9
Sulphide, crystals	ton	17	0	0	to	18	0	0
Sulphide, solid, 60-62%	ton	23	10	0	to	24	10	0
Sulphite, cryst	ton	15	0	0	to	16	0	0
Strontium carbonate	ton	80	0	0	to	85	0	0
Strontium Nitrate	ton	70	0	0	to	72	10	0
Strontium Sulphate, white	ton	7	10	0	to	8	10	0
Sulphur chloride	ton	41	0	0	to	42	0	0
Sulphur, Flowers	ton	13	0	0	to	14	0	0
Roll	ton	13	0	0	to	14	0	0
Tartar emetic	lb.	0	1	6	to	0	1	7
Tin perchloride, 33%	lb.	0	1	2	to	0	1	4
Tin Perchloride, solid	lb.	0	1	5	to	0	1	7
Protochloride (tin crystals)	lb.	0	1	5	to	0	1	6
Zinc chloride, 102 Tw.	ton	21	0	0	to	22	10	0
Chloride, solid, 96-98%	ton	50	0	0	to	55	0	0
Oxide, 99%	ton	40	0	0	to	42	0	0
Dust, 90%	ton	47	10	0	to	50	0	0
Sulphate	ton	21	10	0	to	22	10	0

Coal Tar Intermediates, &c.

Alphanaphthol, crude	lb.	0	3	3	to	0	3	6
Alphanaphthol, refined	lb.	0	3	9	to	0	4	0
Alphanaphthylamine	lb.	0	2	6	to	0	2	8
Aniline oil, drums extra	lb.	0	1	5	to	0	1	6
Aniline salts	lb.	0	1	6	to	0	1	7
Anthracene, 40-50%	unit	0	0	8½	to	0	0	9
Benzaldehyde (free of chlorine)	lb.	0	4	3	to	0	4	6
Benzidine, base	lb.	0	6	0	to	0	6	6
Benzidine, sulphate	lb.	0	6	6	to	0	7	0
Benzoic acid	lb.	0	2	3	to	0	2	6
Benzoate of soda	lb.	0	2	3	to	0	2	6
Benzyl chloride, technical	lb.	0	2	0	to	0	2	3
Betanaphthol benzoate	lb.	0	6	9	to	0	7	0
Betanaphthol	lb.	0	2	3	to	0	2	6
Betanaphthylamine, technical	lb.	0	9	0	to	0	9	6
Croceine Acid, 100% basis	lb	0	4	6	to	0	5	0

	per	£	s.	d.		£	s.	d.
Dichlorbenzol	lb.	0	0	9	to	0	0	10
Diethylaniline	lb.	0	6	9	to	0	7	6
Dinitrobenzol	lb.	0	1	5	to	0	1	6
Dinitrochlorbenzol	lb.	0	1	5	to	0	1	6
Dinitronaphthaline	lb.	0	1	6	to	0	1	8
Dinitrotoluol	lb.	0	1	8	to	0	1	9
Dinitrophenol	lb.	0	2	9	to	0	3	0
Dimethylaniline	lb.	0	3	9	to	0	4	0
Diphenylamine	lb.	0	4	6	to	0	4	9
H-Acid	lb.	0	8	0	to	0	8	6
Metaphenylenediamine	lb.	0	5	6	to	0	5	9
Monochlorbenzol	lb.	0	0	10	to	0	1	0
Metanilic Acid	lb.	0	6	6	to	0	7	0
Monosulphonic Acid (2:7)	lb.	0	7	0	to	0	7	6
Naphthionic acid, crude	lb.	0	4	0	to	0	4	3
Naphthionate of Soda	lb.	0	4	3	to	0	4	6
Naphthylamin-di-sulphonic-acid	lb.	0	4	9	to	0	5	0
Nitronaphthalene	lb.	0	1	4	to	0	1	5
Nitrotoluol	lb.	0	1	3	to	0	1	4
Orthoamidophenol, base	lb.	0	18	0	to	1	0	0
Orthodichlorbenzol	lb.	0	1	1	to	0	1	2
Orthotoluidine	lb.	0	2	3	to	0	2	6
Orthonitrotoluol	lb.	0	0	10	to	0	1	0
Para-amidophenol, base	lb.	0	12	0	to	0	12	6
Para-amidophenol, hydrochlor	lb	0	12	6	to	0	13	0
Paradichlorbenzol	lb.	0	0	7	to	0	0	8
Paranitraniline	lb.	0	4	6	to	0	4	9
Paranitrophenol	lb.	0	2	9	to	0	3	0
Paranitrotoluol	lb.	0	5	9	to	0	6	0
Paraphenylenediamine, distilled	lb.	0	12	0	to	0	13	0
Paratoluidine	lb.	0	7	0	to	0	7	6
Phthalic anhydride	lb.	0	3	9	to	0	4	0
Resorcin, technical	lb.	0	5	0	to	0	5	6
Resorcin, pure	lb.	0	8	0	to	0	8	6
Salol	lb.	0	2	6	to	0	2	9
Sulphanilic acid, crude	lb.	0	1	4	to	0	1	6
Tolidine, base	lb.	0	6	6	to	0	7	0
Tolidine, mixture	lb.	0	2	6	to	0	2	9

Metals and Ferro Alloys

The following prices are furnished by Messrs. Miles, Mole & Co., Ltd., 101, Leadenhall Street, London, E.C.

	Per	£	s.	d.		£	s.	d.
Aluminium, 98-99%	ton	110	0	0	to	120	0	0
Antimony, English	ton	37	0	0	to	40	0	0
Copper, Best Selected	ton	68	0	0	to	69	0	0
Ferro-Chrome, 4-6%	ton	34	0	0	to	35	0	0
Ferro-Chrome Manganese, loose	ton	18	0	0	to	20	0	0
Silicon, 45-50%	ton	14	0	0	to	16	0	0
Tungsten, 75-80%	lb.	0	1	6	to	0	1	9
Lead Ingots	ton	25	0	0	to	26	0	0
Lead Sheets	ton	34	0	0	to	35	0	0
Nickel, 98-99%	ton	190	0	0	to	190	0	0
Tin, English	ton	154	0	0	to	155	0	0
Spelter	ton	26	0	0	to	27	0	0

Structural Steel

	Per	£	s.	d.		£	s.	d.
Angles and Tees	ton	13	0	0	to	14	0	0
Flats and Rounds	ton	13	0	0	to	14	0	0
Joists	ton	14	0	0	to	15	0	0
Plates	ton	14	0	0	to	15	0	0
Rails, heavy	ton	14	0	0	to	14	10	0
Sheets, 24 Gauge	ton	16	10	0	to	17	0	0
Galvanized Corrd. Sheets	ton	20	0	0	to	21	0	0
Zinc Sheets	ton	34	0	0	to	35	0	0

Chemical Trade in Germany

IN a review of trade conditions in Germany, the American Association of Commerce and Trade, Berlin, says: "The chemical industries are having difficulties in marketing goods, both at home and abroad. On the other hand, pharmaceutical products were more readily marketed in June than during May. With regard to dyes, the crisis in the world's market and the sanctions have caused depression in this branch of trade. The wholesale chemical trade has been active in some lines, especially the export to England, but not at very favourable prices. The increase of tariff and anti-dumping laws in foreign countries is gradually curtailing this industry.

A recent advice from New York states that Mr. Henry Ford has bought 857 truck loads of CORDITE made by the British Government and stored near New York. A new artificial leather process in which cordite is used has, it is stated, been developed at the Ford laboratories.

Nitrate of Soda

MESSRS. HENRY BATH & SON, LTD., in their monthly report on the nitrate market, say: Insufficiency of rain during August again restricted the use of nitrate and the month's deliveries amounted to only about 19,500 tons, compared with 25,000 tons a year ago. Continental markets continue dull, business for immediate delivery in Belgium having been transacted under pressure of competitive selling down to the parity of about £14 per ton. Nitrate f.o.b. Chile in second hands is quoted at about 9s. 8d. per quintal for ordinary and 10s. per quintal for refined, at which latter price some small lots have been sold for destinations outside Europe. On this basis the quotation for cargoes of ordinary quality afloat or for shipment within the next month or so is approximately 13s. per cwt. c.i.f. for the usual range, but practically nothing is on offer. During the past month an active exchange of views has been taking place between the European Pool, the Nitrate Producers Association and the Chilean Government, and it is sincerely hoped that these communications may lead to an early settlement, in order that plans for the forthcoming season of consumption can be formulated without further delay. At a meeting in London on August 9 of the English nitrate producing companies, it was decided strongly to urge the abandonment of the idea of consignments to Europe by the Association, and, at the same meeting, to propose the outlines of a new scheme for a settlement of the points at issue. Briefly, this scheme is as follows:—The prices of 14s. per quintal f.a.s. Chile for July-March and 9s. 9d. to 9s. 3d. for April-June to be withdrawn, and 9s. 6d. to 11s., according to date of shipment, to be substituted, from the present date until June 30, 1923. The Pool to reduce its selling prices in consuming markets to the same parties, say £14 to £15 10s. delivered, on the basis of freight for Europe at 50s. In compensation for the reduction of prices the Pool to receive a payment of so much per quintal (8d. is suggested) on the next 90,000,000 quintals of new nitrate sold and shipped by the Association, and in order to expedite a resumption of shipments by the Association, the Pool and the Association to agree to a 50 per cent. participation each in supplying the needs of consumption, with the effect that the Pool would in all probability have to carry forward a certain proportion of its stock from the 1921-1922 season to the one following. The cost of this scheme does not seem heavy compensation to pay for lowering the minimum price from 14s. to 9s. 6d., nor a big sacrifice to make for the many advantages of a settlement. On the invitation of the President of the Republic, the chairman of the European Pool is on his way to Chile, where the privilege of his personal intercourse with the Government should go far to bridge the differences of opinion at present existing amongst those who have only the welfare of the industry at heart. A report from Belgium states that next spring Germany will deliver to Belgium, under the terms of the Peace Treaty, potash instead of nitrogen. Last spring Belgium received from Germany in reparation a considerable quantity of sulphate of ammonia and cyanamide. According to information from Germany, 8,000 tons of German-owned nitrate, which has been lying at Montevideo since the outbreak of war, are coming forward to Hamburg for account of the original holders. Freights are inactive. Some early liner space for the Bordeaux-Hamburg range is reported fixed at 40s. to 45s., while steamers for December-January loading are probably obtainable at the same rates.

German Dyes in Holland

DUTCH chemical manufacturers are much concerned over the appearance of low-priced products from Germany where the exporters are seeking to re-establish themselves in their former markets. The manufacturers of Holland, according to an article by Mr. O. P. Hopkins, in the *Journal of Industrial and Engineering Chemistry*, declare that the prices of German chemicals have been lower than the prices of raw materials from which the chemicals are manufactured across the Rhine. The principal imports into Holland in 1920 were aniline dyes and indigo, colours, paints and varnishes, sodas, and perfumery and toilet articles. The leading exports were colours, paints and dyes, glues and gelatine, perfumery and quinine salts.

Company News

BURNLEY PAPER WORKS.—The directors announce a dividend of 9d. per share.

BELL'S UNITED ASBESTOS.—The directors announce an interim dividend on the ordinary shares of 6d. per share, or 2½ per cent., less tax, against 5 per cent., less tax, a year ago.

CANADIAN EXPLOSIVES.—The directors announce a dividend of 1¾ per cent. on the 7 per cent. cumulative preferred shares for the quarter to September 30, payable October 15, to holders registered on September 30.

LEVER BROTHERS, LTD.—A report found free circulation on the Liverpool Stock Exchange last week that a new issue of debentures by Lever Brothers was to be made at an early date. No definite information could be obtained, but the rumour was said to be responsible for some offering of both classes of Lever Preference shares.

BORAX CONSOLIDATED.—A dividend at the rate of 6 per cent. per annum, less tax, has been declared on the preferred ordinary shares in respect of the half-year to September 30. Coupon No. 28 will be paid, less tax, on and after November 1, at the company's offices, 16, Eastcheap, E.C.3. The half-yearly coupon No. 45 of preference share warrants will be paid, less tax, same date and place. The transfer books of the preference and preferred ordinary shares will be closed from October 17 to 31 inclusive.

ANGLO-CHILEAN NITRATE & RAILWAY CO., LTD.—A Stock Exchange announcement states that dealings in the following securities have been specially allowed by the Committee under Rule 148a. These securities will rank *pari passu* with those in which special settling days have already been appointed as soon as they are identical and the certificates are ready for distribution, and with those for which an official quotation has already been granted as soon as they are identical and are officially quoted: 550,000 ordinary shares of £1 each, fully paid, Nos. 1 to 550,000; and 350,000 preference shares of £1 each, fully paid (seven per cent. cumulative and participating), Nos. 1 to 350,000.

LIGHTING TRADES, LTD.—At the first annual meeting held on September 30, Mr. H. J. Mitchell (the Chairman) said that considering the difficult period through which the company has passed since its inception, it would be agreed that the position shown by the accounts was quite satisfactory. The net profit for the fifteen months under review was £36,951, after meeting all charges, including full provision for depreciation. Deducting the preference dividend paid, there was a net available balance of £28,000, which, in view of the present industrial depression, the board had decided to carry forward. A report of the meeting appears on another page.

EASTERN CHEMICAL CO.—The net profit for the year to March 31 last, amounted to £10,362, plus refunds of excess profits duty and income-tax amounting to £3,083; total credits, £13,444. The balance brought in was £12,245, which added to the above £10,362 makes £22,607. The £3,083 refunds of excess profits duty and income-tax have been placed to a special reserve to meet possible contingent liabilities. The dividend of 10 per cent. on participating ordinary shares, less English income-tax, is the same as for the two previous years. With regard to the Tata Iron and Steel Co.'s offer referred to in last year's report, the directors were anxious to carry the scheme through, but this was found to be impracticable owing to the altered circumstances. Meeting, 13, Fenchurch-Avenue, E.C., October 13, noon.

MOND NICKEL CO.—The company is prepared to issue definitive certificates for the £1,300,000 8 per cent. mortgage debenture stock in exchange for fully-paid allotment letters or provisional scrip certificates to bearer (with the form of request on the back of such allotment letter or scrip certificate to register duly completed), which should be surrendered to the company's transfer department, 39, Victoria Street, S.W. 1. Interest due November 1, 1921, will be paid to stockholders who have applied for registration before the closing of the books on October 17. The transfer books of the 5 per cent. first mortgage debenture stock, 6 per cent. redeemable debenture stock and 8 per cent. mortgage debenture stock will be closed from October 17 to 31, inclusive, for preparation of warrants for interest, payable November 1.

BRITISH GLUES AND CHEMICALS.—The net profit for the period from January 10, 1920, to May 31 last, including interest on investments and loans, after due allowance has been made for bad and doubtful debts, depreciation and directors' remuneration, and after making provision for reduction of stocks to market values, was £241,722, less the whole of the preliminary expenses and expenses incurred in connexion with acquiring new businesses written off £57,879 and preference dividends paid £33,969, leaving £149,872, subject to taxation and to capitalisation of profits earned prior to incorporation, the net amount of which cannot be ascertained until the company's liability for taxation is agreed. Amalgamation of eight separate companies has raised complex questions in connexion with excess profits duty, corporation tax and income tax, and it has not yet been found possible to form any reliable estimate of liability in respect of these taxes. A dividend at the rate of 8 per cent. per annum on the preference shares is being paid for the half-year to September 30 last, but the directors regret that, in view of the present condition of trade and the consequent necessity of conserving resources, they are unable to recommend a dividend on the ordinary shares. The directors have purchased the business of Lomas Gelatine Works, of Plymouth. Meeting, Cannon Street Hotel, E.C., October 13, at noon.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

LOCALITY OF FIRM OR AGENT.	MATERIALS.	REF. NO.
Winterthur ...	Chemicals for the soap, paper, dye, bleaching, printing, and tanning industries.	288
San Francisco	Heavy chemicals for electro-plating; non-ferrous metals.	291
Lyons ...	Chemicals	300
Latvia ...	Oils. Replies to the Department of Overseas Trade, 35, Old Street, London, S.W.1.	

Tariff Changes

BRITISH HONDURAS.—Various amendments to the Customs Tariff are made by an Ordinance which is effective from August 23 last to March 31, 1922. The Ordinance increases the duty of 15 per cent. *ad valorem* wherever it appears under the General Tariff Column in the first Schedule to the Customs and Excise Duties Ordinance, 1920, to 20 per cent. *ad valorem*. This affects a large number of articles, the corresponding duty on which under the British Preferential Tariff is, in most cases, 10 per cent. *ad valorem*. The Preference accorded certain British goods is thereby increased to the extent of 5 per cent. *ad valorem*.

SOUTHERN RHODESIA.—The Board of Trade have received a copy of the complete Customs Tariff for Southern Rhodesia, which was issued under Ordinance No. 30 of 1914, and subsequently amended and extended, and also a copy of the Excise Tariff and corresponding Customs Tariff issued under various Excise Ordinances. These Tariffs may be seen by persons interested on application to the Tariff Section, Department of Overseas Trade, 18, Queen Anne's Gate, S.W.1.

ICELAND.—As from January 1, 1922, importation of alcohol and spirits, containing more than 2¼ per cent. of alcohol will be prohibited except through the Icelandic Government. Further regulations will be issued regarding the administration of the monopoly (which is established by this Order) which will provide, *inter alia*, for its extension to cover methylated spirits and alcohol for industrial purposes.

NORWAY.—In order to secure the benefits of the minimum tariff certificates of origin are required on the importation of iron oxide, quicksilver and sulphur.

TURKEY.—As from September 13 last Customs import duties will be collected at the rate of 11 per cent. *ad valorem*. A translation of the Turkish Decree was published in the Board of Trade *Journal* (September 29, page 335).

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

London Gazette

Partnership Dissolved

BARRICK, FREDERICK, and BUDD, A. E., as soap manufacturers and wholesale and retail soap dealers, at Back Eaves Street, Blackpool, under the style of Barrick & Budd's Soap Co., from Sept. 20, 1921, so far as concerns Arthur Edgar Budd, who retires from the said firm. Debts received and paid by F. Barrick, who will continue the business.

Release of Trustee

BELART, JEAN, late 29, Upper George Street, Huddersfield, now of 177, Hyde Park Road, Leeds, consulting chemist. Trustee, Harry Clifford Bowling, 24, Bond Street, Leeds, Official Receiver. Date of release, July 27.

Companies Winding-up Voluntarily

BRISTOL DRY SOAP CO., LTD.—Raymond Hugh Wickham, of 6, Wetherall Place, Clifton, Bristol, appointed liquidator.

LYMN CHEMICAL ENGINEERING CO., LTD. (in voluntary liquidation).—Meeting of company at the offices of F. W. Stephens & Co., 26/30, Salisbury House, London Wall, E.C.2, on Tuesday, November 8, at 12 noon, to receive liquidator's report of winding up. F. W. Stephens, liquidator.

WESTERN COUNTIES & GENERAL MANURE CO., LTD. (in voluntary liquidation).—Meeting of company on November 5 at the registered office of the Company, 10, Princess Square, Plymouth, at 12 noon, to receive liquidator's report of winding up. Eric R. Ward, 10, Princess Square, Plymouth, solicitor for Frederick Malcolm Boswarva and Walter John Robins, the liquidators.

Mortgages and Charges

*[NOTE.—The Companies Consolidation Act, of 1908, provides that every Mortgage or Charge, as described therein, created after July 1, 1908, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges which would, if created after July 1, 1908, require registration. The following Mortgages and Charges have been so registered. In each case the total debt, as specified, in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced since such date.]*

CRONE & TAYLOR, LTD., St. Helens, manure manufacturers.—Registered September 16, £1,500 second debenture; general charge. *£15,000. August 30, 1921.

HORTON MANUFACTURING CO., LTD., Rickmansworth, soap manufacturers.—Registered September 23, £1,000 second debenture; general charge. *£2,700. December 25, 1920.

SMITHS (HAMPTON) LTD., London, E.C., soap manufacturers.—Registered September 2, £18,500 debentures secured by Trust Deed dated September 2, 1921; charged on land, factory, &c., at Hampton, also general charge.

WESTERN TABLET CO., LTD., London, W., chemists.—Registered September 21, £2,000 debentures, present issue £900; general charge. *Nil. November 15, 1920.

Receivership

NELL (R. J.) & CO., LTD.—C. Dickinson, of Louth, Lincs, ceased to act as receiver or manager on September 12, 1921.

County Court Judgment

[NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.]

CONGREVE & CO., Southmead, Westbury-on-Trym, dyers. £14 8s. 10d. August 13.

New Companies Registered

The following list has been prepared for us by Jordan & Sons, Ltd., company registration agents, 116 and 117, Chancery Lane, London, W.C.2:—

ALL BRITISH OIL SYNDICATE, LTD., 9, Victoria Street, S.W. 1, dealers in petroleum and other mineral oils. Nominal capital: £60,000 in 60,000 shares of £1 each. Directors to be appointed by subscribers. Qualification of directors, £1,000. Remuneration of directors, £100 each; chairman, £150. Subscribers: T. R. Andrews, L. Helliwell, F. C. Workman, W. H. Franklin.

ANGLO-CONTINENTAL METALS, LTD., 5, Bishopsgate, E.C., exporters and importers of ferrous and non-ferrous metals and metal products. Nominal capital: £10,000 in 8,000 preference shares of £1 each, and 40,000 ordinary shares of 1s. each. Directors, W. M. Warman, J. W. Maidment.

ASBESTOS SUPPLY & COVERING CO., LTD., Baltic Yard, 213A, Hoe Street, Walthamstow, E.17. Manufacturers of asbestos goods. Nominal capital, £1,000 in 1,000 shares of £1 each. Directors: F. L. Smith, C. A. Cronin, S. J. Smith, H. J. Cole. Qualification of directors, £1. Remuneration of directors, £30 to be divided.

DAVIS, J. W., & SON (HULL), LTD., Wilmington, Kingston-upon-Hull. Varnish, paint and colour manufacturers Nominal capital, £10,000 in 1,000 shares of £10 each. Directors: P. W. Davis, Minnie Davis. Qualification of directors, £100. Remuneration of directors, £25 each. Chairman £500.

EGLINTON MAGNESITE BRICK CO., LTD., Colonial House, 17, Tooley Street, S.E.1. Manufacturers of magnesite bricks. Nominal capital, £50,000 in 50,000 shares of £1 each. Directors: C. Brenner, W. Donald, A. A. Eekhout, J. Le Boutillier, Dr. L. Pawlaezky. Qualification of directors, £10. Remuneration of directors, £100 to be divided.

FOCUS HEAD LIGHT CO., LTD., 139, Cannon Street, E.C.4. Producing, refining, storing and distributing petroleum and other oils. Nominal capital, £1,000 in 1,000 shares of £1 each. Minimum subscription, 7 shares. Directors: D. J. Neame, F. G. Piper. Qualification of directors, 25 shares. Remuneration of directors, £50 each. Chairman, £75.

HYGIENIC PETROL CO., LTD., 44, George Street, Baker Street, W.1. Manufacturers of essences, vaporisers and liquid soaps and other chemical products. Nominal capital, £500 in 500 shares of £1 each. Director: T. Jackson.

INTERNATIONAL ELECTROLYTIC PLANT CO., LTD. To acquire patents for inventions relating to electrolytic apparatus for producing oxygen and hydrogen. Nominal capital: £11,000 in 10,000 prefeerence shares of £1 each, and 20,000 ordinary shares of 1s. each. Director, A. E. Knowles. Qualification of directors, £10.

POWELL WOOD-PROCESS SYNDICATE, LTD., 715, Salisbury House, London Wall, E.C.2. To acquire from John William Kitchin, of 715, Salisbury House, London Wall, E.C., the goodwill and assets of the Powell Wood-Process Syndicate, Ltd., and carry on the business of timber merchants, &c. Nominal capital, £25,000 in 25,000 shares of £1 each. Directors: J. W. Kitchin (chairman), M. B. Dickie, F. A. Labouchere, A. E. Showell, W. Birch. Qualification of directors, 500 shares. Remuneration of directors, £100 each. Chairman £200.

RAPP OIL CO., LTD., 86, Leadenhall Street, E.C., trading and dealing in oils and other minerals. Nominal capital: £1,000 in 20,000 shares of 1s. each. Directors, A. Richmond, R. E. Reid, G. G. Proctor, H. R. Atkinson, W. F. Pearce. Qualification of directors, 1 share. Remuneration of directors, £250 each; chairman, £300.

SMEATON & SONS, LTD., 27, Lamb's Conduit Street, W.C.1. Chemical engineers, &c. Nominal capital, £1,000 in 1,000 ordinary shares of £1 each. Directors: W. H. M. Smeaton, C. M. Smeaton. Qualification of directors, 1 share.

VEGLENT OIL REFINING & CHEMICAL WORKS, LTD. Manufacturers and dealers in oils and chemical products. Nominal capital, £5,000 in 5,000 shares of £1 each. Directors: E. Fisher, Menotti Del Guerra.

Lighting Trades, Ltd.

Safeguarding of Industries Act Criticised

At the first annual general meeting of Lighting Trades, Ltd. on September 30, Mr. H. J. Mitchell (the chairman), referring to the circumstances which led to the formation of the company, said that before the war the British gas mantle manufacturers were struggling against heavy odds. Foreign mantles were dumped into this country in large quantities at extremely low prices, and the development of the British gas mantle trade was handicapped by the control which the foreign combine had of the sources of supply of monazite sand and, in turn, of thorium nitrate.

It was not surprising, therefore, that both during the war and after, some of the leading British manufacturers turned their thoughts towards an amalgamation of interests as a means of consolidating and strengthening the position attained by them during the war. The company, which was originally incorporated as the Record Gas Mantle Co., Ltd., first acquired the "Ironclad" gas mantle business of Messrs. Curtiss & Harvey, Ltd., and subsequently the business of the Ramie Co., Ltd. (embracing the British Thorium Syndicate), and the Volker Lighting Corporation, Ltd., so that they now owned four of the seven principal mantle factories and one of the two ramie works, while of the two principal thorium factories in this country they owned one and had a joint interest in the other. Their position had been further strengthened by the substantial interests they held in companies which manufactured magnesia rings and produced monazite sand, and they were to-day in the unique position, as far as incandescent mantle manufacturers were concerned (British or Continental), of producing within their own organisation all the principal materials used for, and the component parts of, incandescent mantles.

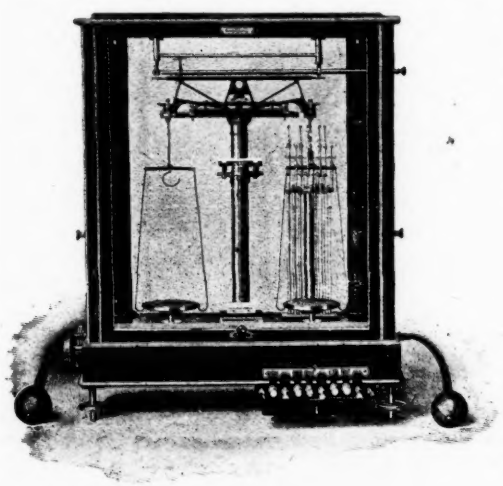
Since the formation of the company two important factors had adversely affected the general position of the industry—firstly, the failure of the Government to specify gas mantles as a "key" industry in the Safeguarding of Industries Act; and, secondly, the general slump in trade.

With regard to the former, it had been confidently hoped and justifiably anticipated that gas mantles would find a place in the final Bill, because of their inclusion in the earlier Bill and of the comments in the reports of the Dominions Royal Commission and of Lord Balfour of Burleigh's Committee on Essential Industries. The knowledge which the Board of Trade must possess of the vital national importance of gas mantles had lent support to the view that no such mistake would be made as not to include them among industries to be encouraged and protected on national grounds. Opposition had been expected from importers of foreign mantles, but it had not been anticipated that the most energetic and powerful opposition would emanate from quarters which one could properly expect to be supporters of British industry.

The position of the industry was keenly appreciated by their workers, whose representatives did all they could in support of the efforts of the British manufacturers to secure the inclusion of gas mantles in the Bill. This absence of official support would, of course, intensify the difficulty of meeting concerted competition from the Continent.

Italian Production of Leucite

UNITED STATES Consul, Byington, reports that a deposit of leucite from which is derived a potash fertilizer, is in operation near Civita Castellana, provincia di Roma, in Italy. The deposit is said to have an extent of about three square kilometres and up to the present all workings are near the surface. The report states that chemically, the raw product is a double silicate of potash and aluminium, containing 21·5 per cent. of potash in the form of an oxide K_2O. The product, the report continues, is valuable as a fertilizer, since the potash is gradually released by the action of water and the weak acids present in plant roots. Leucite is now used extensively in Italian agriculture where formerly German potash was used and has given excellent results in the cultivation of rice, potatoes, sugar beets, tobacco, rye, oats, and barley. By its use, soils too acid for successful cultivation have been reclaimed.



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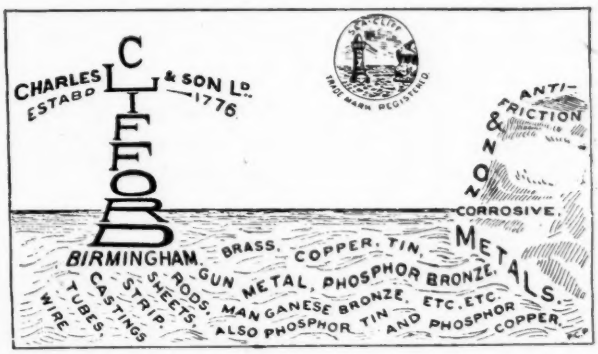

PUBLISHER'S ANNOUNCEMENT

New "copy" for advertisements must arrive on or before Tuesday preceding date of publication. Blocks with solid black background are not accepted. Line blocks are preferable to half tones.

All advertisements, other than full page size, must be enclosed in a complete rule border.

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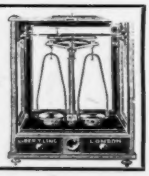
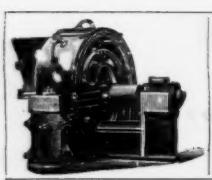


Chemical Plant

BENNETT SONS & SHEARS, Ld.
43, SHOE LANE,
LONDON, E.C.4.

Chemical Plant



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In five grades.

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